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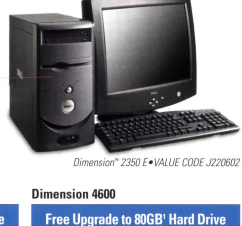
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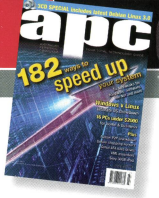
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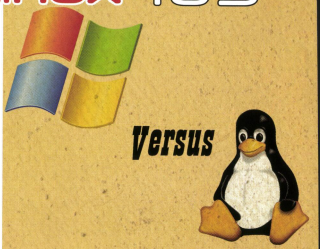
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Bill Gates and the Penguin duke it out over five rounds. Read our definitive guide to see which OS takes the heavyweight crown.



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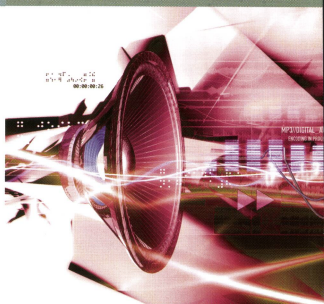
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This multimedia unit (left) combines a PC with a TV, DVD, stereo and FM radio.

PowerColor ATI Radeon 9800 Pro vs Abit Siluro GeForce FX 5800

Abit IC7-G motherboard

Sony CLIÉ PEG-TG50



AMD Athlon XP 3200+

SnapGear PC1630 VPN NIC

Pinnacle Edition 5

Proxim ORiNOCO Gold ComboCard and AP-600 Access Point



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Sub-$2,000 PCs

We've got the vendors' best machines in the sub-$2,000 category. These 16 systems are put through the wringer in the *APC* Labs, but which one is top dog?



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Design 3D worlds, images and animations in a professional-level application development environment. Blender provides a suite of tools for 3D modelling, animation, rendering and post-production. You can even create game scenes and graphics.

Speed up your PC

Squeeze some extra performance out of your PC. From faster boot-ups to quicker hard disk access, turbo-charged graphics and a zippier Net connection — we've rounded up the best freeware and shareware utilities to pep up your PC, and your handheld too.

All in fun

Fresh from the E3 games-fest in Los Angeles, nVidia lampoons its infamously noisy GeForce FX 5800 graphics card in this spoof video. Of course it's easier to laugh now that its successor, the super-cool and quieter GeForce FX 5900 Ultra, has been unveiled.

Full CD index

CD 1

Full versions

- **Altova XMLSPY 5 Home Edition** full-working version, upgrade offer
- **Tweak-XP 1.27** full-working version, special offer, Tweak-XP 2.0.10 trial
- **Virtual CD 3.0.8 Network Edition** full-working version, upgrade offer, Virtual CD 5.0 trial

Speed tweak and tips

BIOS • BIOS Wizard
Graphics • CoolBits Reg • RivaTuner
Hard Drives • CacheBooster 1.00 • Cacheman 5.11
Internet • TweakMASTER 1.71 • Download Accelerator Pro 5.3
Memory • FreeMem Standard 4.3 • MemTurbo II 2.1 • RAMpage
Windows • Tweak Manager 2.11 • Tweak UI 1.33 • Tweak UI for XP • Tweak-Me Gold 1.0 • Tweak-XP 2.0.10

Workshop

98lite • 98lite Preview 4.5
Jabber • jabber-1.4.2a-6mdk.i586.rpm • jabber-conference-1.4.2a-6mdk.i586.rpm • jabberd-quickstart-0.2-linux.tar.gz • jabuser.sh
Optimising Linux • Linux Kernel 2.4.20
P2P • BCDC++ 0.242c • DC++ v0.25 • DirectConnect 1.0 build 9 • DirectConnect for OS X 1.0 build 9 • eDonkey 2000 for Mac 0.47 • eDonkey 2000 graphical front end 1.1.2 for Mac OS X and Linux • eDonkey2000 0.48.1 GUI • eDonkey2000 for Linux 0.48.1 • eMule 0.28b
Palm • CrossingOver • FastCPU • FileProg • LauncherX • Mass Transit • QLaunch • Quickbits Accelerator • SlideFree • TealGlance • Wassup
Photoshop • Digital GEM • Extended HotKeys Action Set • Photoshop 7 Keyboard Shortcuts • PSD2FLA • Xenofex 2
Pocket PC • Access Panel • Battery Pack 2003 5.0 • Button Mapper • Calligrapher 6.5.1 • Clear Speed 2.0 • Double Launcher 2.0 • Fitaly keyboard 3.0 • Icbar 1.1 • Launcher 1.30 • Pocket Hack Master 2.39 • Soft Reset 1.0 • Spb Full Screen Keyboard 1.4 • Speed Stepper 0.92 • Turbo Tray 472 0.91 • Wisbar 1.1 • XScaleCtrl 1.5.0

On Test

Blender 2.27 full-working version

Techlife

- Breed
- nVidia FlowFX Video

Tweak-XP 1.27

Full version

Tweak-XP optimises the Windows XP operating system as well as your PC's memory, CPU, hard drive, display, Internet connection and more. It's the ultimate tweaking tool, and yours for free on this month's *APC* cover CD.

Valued at $53

Adobe Acrobat 6.0 PDF reader

Version 6.0 of the Acrobat Reader, now named Adobe Reader, was released at the end of May. And you can save yourself a hefty download, because the new releases for Windows and Mac are included in this month's Toolkit section on CD1.

Debian Linux 3.0r1

If you've moved beyond the Windows wanna-be status of other distros, try the power user's distro. Check out the "Up and running with Debian 3.0" feature in this month's Workshop section (page 118) for more details. We've also included a choice set of packages, and the latest versions of many popular Linux applications, to give your installation a 650MB kick-start.

Installing Debian from the *APC* CDs

The Debian 3.0r1 setup will boot from CD2. You'll need an Internet connection to complete the install. To load the packages on CD3, mount the CD-ROM with the command mount /cdrom **and then use either the shell command** dselect **or the KDE package manager Kpackage. Add the path /cdrom/pool as an apt source, and select the packages to install or upgrade. It's best to also have a Debian download mirror configured. Some small packages may still need to be sourced from the Net.**

Toolkit

Linux
- Adobe Acrobat Reader 5.0.6
- Firestarter 0.9.1
- gFTP 2.0.14
- GIMP 1.2.4
- RAR for Linux 3.20
- RealPlayer 8.0
- SADP 3.1.5d
- XMMS 1.2.7
- Xmovie 1.9.9

Mac OS
- A4 Paper Sizes 10.2
- Adobe Reader 6.0
- Bibliographer X 1.1.2
- InfoEdit 2.0
- iSwipe 1.3b4
- MT-Newswatcher 3.2
- TinkerTool 2.32

Windows
- Ad-aware Standard 6.0
- Adobe Reader 6.0
- DirectX 9.0 runtime
- DivX Video 5.0.5
- ICQ Pro 2003a Beta Build #3800
- IE Title Modifier 1.0
- PowerPoint Viewer 97
- RealOne Free Player 2.0
- Spybot - Search & Destroy 1.2
- Winamp3 Full
- Windows Media Player 9
- WinZip 8.1 SR1
- WS_FTP LE 5.08
- ZoneAlarm 3.7.159

Browsers
- Microsoft Internet Explorer 5.1.6 for Mac OS
- Microsoft Internet Explorer 5.2.2 for Mac OS X
- Microsoft Internet Explorer 6.0 SP1
- Mozilla 1.3.1
- Opera 7.11 bundled with JRE

CD 2

Debian Linux 3.0r1 Install

CD 3

Debian Linux Essentials
- Apache 1.3.26
- BPAlogin 2.0.4
- Doom legacy
- Ethereal 0.9.4
- Evolution 1.0.5
- Nautilus 1.0.6-5
- Ogg Vorbis codecs
- Opera 7.11
- Open Office 1.03
- Quake II engine (official Quake II CD still required)
- XMMS 1.2.7
- And lots more . . .

Need help?

- **While we've taken all care in selecting the software and testing the discs, *APC* cannot accept responsibility or liability.**
- ***APC* does not provide support for programs included on the discs.**
- **For technical problems:**
  Email: cd@apcmag.com
  Web: www.apcmag.com/cd
  Phone: (02) 9288 9111

Debian technical support

APC can't provide technical support for Debian Linux 3.0 installation, but we'll replace any faulty CDs. Check the back of the CD sleeve for details. See the Debian Workshop on page 118 for information on third party installation support.

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AUSTRALIAN PERSONAL COMPUTER
YOUR TOTAL TECHNOLOGY GUIDE

EDITORIAL

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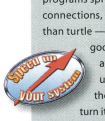
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ISSUE 295 JULY 2003



Speed. That just about says it all, doesn't it? The ruthless deal-maker Gordon Gekko almost got it right in the movie *Wall Street* when he proclaimed with religious fervour: "Greed is good". Sorry, Gordon, it's *speed* that's good.

Speed is what we all crave. From the initial BIOS bootup, to Windows starting in half the time and programs sprinting off the blocks. Zippier Internet connections, with downloads that hurtle — rather than turtle — down the line. After all, you've paid good money for a PC with a big hard drive, ample memory and a fast graphics card. It's understandable that you don't want to sit there watching it depreciate every time you turn it on or click the mouse.



And because the staff at *APC* spend more time than they'd like to admit in front of a PC, we know how you feel. This isn't some wild-eyed overclocking obsession. We just want things to be a little zippier so we spend less time waiting for things to happen.

For this reason, we've included some of our favourite speed tweaks in this issue — and it goes way beyond the cover feature (see page 82).

We've peppered the entire edition with tricks and techniques to get your PC galloping along: from our reviews of AMD's latest XP 3200+ chip to faster wireless networking gear.

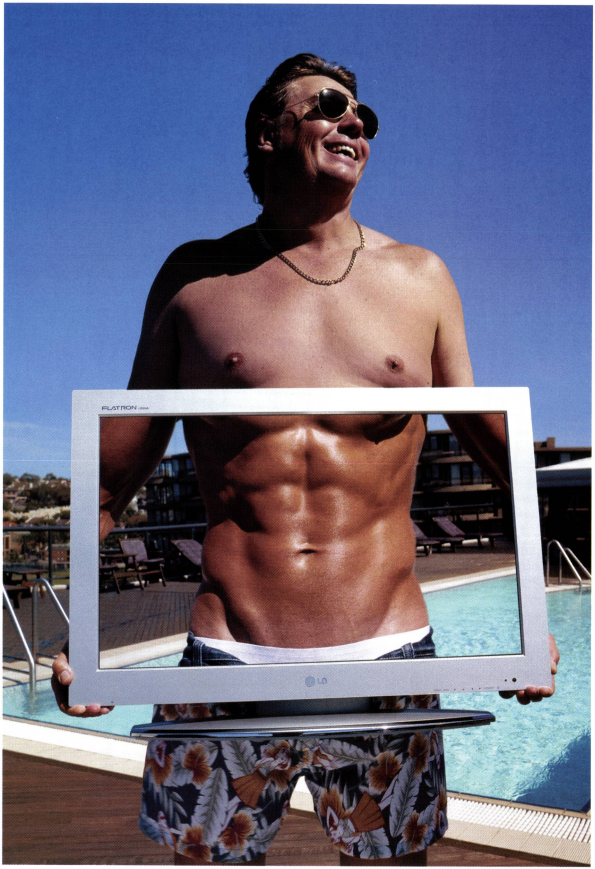
Plus, in the Workshop section you'll find strategies for boosting Linux, Photoshop, even Palm and Pocket PC handhelds.

All up, there are 182 ways to speed up your system, so you can spend less time waiting and more time getting down to work, playing or just chillin' out.

And that's got to be a good thing, right?

David Flynn

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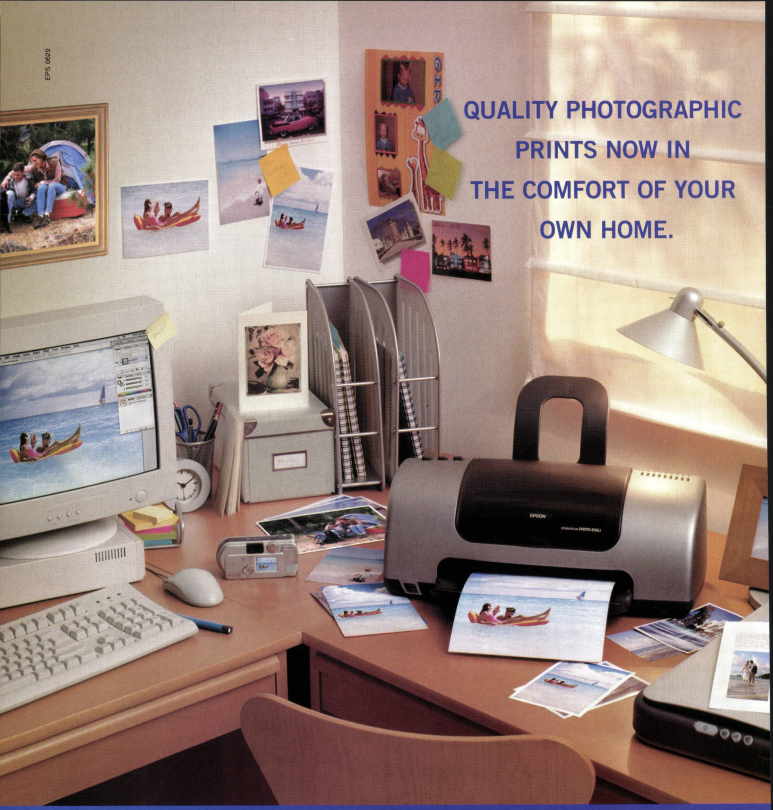
THIN IS BEAUTIFUL



At less than 10 centimetres thick, the only thing the LG Flatron LCD computer monitor is big on is superior picture quality. Available in 15, 17, 18, 20, 22 and 30 inch sizes. www.lge.com.au

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News, views and analysis from the IT world

Pay TV stowaways

PC users are hacking pay TV, yet network operators Foxtel and Optus don't seem to care. *Justin Kranzl* reports.



When is pay TV not pay TV? When it's free. Thousands of people are using TV tuner cards and software downloaded from the Internet to hitch a ride on the cable networks of OptusVision and Foxtel. The picture can be grainy and occasionally distorted, but it works.

Is this another case of the intrepid PC hacker spirit, or merely the urge to get something for nothing? Moderators of the popular Austech forums (**www.austech.info**) claim the former. "If you do want free TV and are reading this, please go elsewhere," warns a terse notice from administrator Ozchips. "You're *not* welcome here."

But judging by the number of users trading information on the subject, most people are tuning out to that part of the message.

Browsing forum postings yields detailed information on the best hardware to use, and the software required, to decrypt Foxtel's signal.

Of course, the motivations of cable TV hackers are irrelevant to the commercial interests affected. Foxtel and Optus simply regard their activities as piracy. But when it comes to taking action, both seem willing to pass the buck onto the industry body.

When *APC* spoke to Foxtel and Optus corporate affairs, neither claimed any knowledge of the issue. The Optus spokesperson limited herself to reiterating the company's position on piracy: "Optus takes piracy of subscription television very seriously. Piracy is a crime incurring civil and criminal penalties. We continue to work closely with other pay TV operators and ASTRA [Australian Subscription Television and Radio Association] to discourage piracy." The Foxtel spokesperson was even briefer, noting that piracy was "an industry issue, not a Foxtel issue".

Debra Richards, executive director of ASTRA, wouldn't say if it was even possible to detect tuner hackers' illicit use of pay TV. She did admit that, to date, no action had been taken against the pirates.

The hackers insist it's impossible to tell who is using a "live" signal feed, and say they'd have to be caught red-handed to be prosecuted.

And that's easier said than done. PC-based hacking puts ASTRA in unfamiliar territory. Its traditional enforcement involves busting people selling illegal smart-cards which allow unpaid access to some or all of an operator's channels.

Richards concedes that PC-based hacking has the potential to cause the industry significant problems. "We do see some difference in the convenience of having your PC close to [a pay TV outlet]," she said, "but we're concerned about all forms of piracy.

"It is costing the industry money, the rights-holders money and the consumers money."

Richards is trying to spread her message not only through collaboration with ASTRA members, but also by dialogue with the Internet Industry Association (IIA). And if the "piracy is theft, theft is a crime" message breaks down, she hopes law enforcement bodies will be able to take up the slack.

Richards was also unable to provide any detail on detecting illegal use of the network. She did note that the media companies had fraud investigators working on detection and said that ASTRA was engaged in educating law enforcers about the wider issue of TV tuner piracy.

"We've instituted a 'dob in a pirate' hotline," she said, saying that shame was as effective a deterrent as more directly punitive measures.

As for ASTRA's future enforcement efforts: "We'll go where the piracy is."

If they can find it. STOP

The spokesperson noted that piracy was "an industry issue, not a Foxtel issue"

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Office XP price review

Microsoft will review Australian retail pricing for Office XP later this year, following price cuts in the US.

In the US, retail prices have dropped slightly from US$599 to US$499 for Office XP Professional, and from US$479 to US$399 for Office XP standard. Standalone versions of Word, Excel, Powerpoint and Access have also dropped by more than US$100.

At the time of writing no price cuts were confirmed in Australia, but Redmond said the cuts would be rolled out around the world. Microsoft Australia said it was planning to review pricing here in the third quarter.

"In Australia, we regularly review local pricing to ensure that customers continue to pay competitive prices for Microsoft software," said Tony Wilkinson, Microsoft Australia's Office product manager. "Consequently, when we carry out our next local pricing review we will take these latest price changes into consideration."

The next version of Office, dubbed Office 2003, is also now expected sometime late in the year. At the time of writing it was not yet clear what the US price reductions would mean for new upgrade costs.

Business also get a sweetener, with bonus training, support, and deployment and management tools for customers of Microsoft's Licensing 6.0 volume pricing program. Employees will be able to use Office on home computers as well as at work, and have access to better phone support. Plus they'll receive Microsoft TechNet bug information service. The changes come into effect in September.

The move follows fierce criticism over the company's switch last year to annual "maintenance" charges for customers buying bulk licenses. Despite speculation some customers would defect to Linux, Redmond has reportedly signed up 65% of Australian enterprise customers.

Microsoft's vice-president for worldwide pricing, Bill Landefeld, admitted relationships with some customers had been "strained" by the experience. He described the new changes as an effort to rebuild those relationships.

"Over the past 18 months . . . we definitely recognised that we didn't communicate those changes very effectively. We've heard the criticism, and we've learned from our past missteps," Landefeld said.

Get Linux, get sued?

The age-old question of who owns Unix is back in the spotlight.



Call it the battle of the software camps. Commercial Unix vendor SCO is squaring off against Linux-convert IBM and a worldwide community of open source coders who claim their right to build Unix-like free software is under threat.

A lawsuit filed by SCO alleges that Linux contains lines of software code copied directly from within its own Unix product, breaching trade secrets and copyright laws. SCO claims that those responsible were IBM engineers, who it accuses of trying to "destroy all value of Unix". Letters have been sent to 1,500 commercial Linux customers, warning them they could be breaching copyright.

"There is line-by-line code in the Linux kernel that is matching up to our UnixWare code, " said SCO's Chris Sontag in an interview published by CNet. "Legal liability may rest with the end users . . . They need to know they have exposure in this issue."

The code fight once again thrusts into the spotlight the question of who owns Unix. Linux developers claim they are being unfairly stifled and that the SCO lawsuit represents its last stab at maintaining a stranglehold over code that long ago wormed its way into free software used by millions around the world.

The code in question forms the bedrock for much software development over the past 40 years or more. SCO gained the rights to Unix in 1995 — ownership has been passed down since development began in the 1960s — but the coding community claims it has an equally important role in the technology's history.

Like uncredited film scriptwriters, Unix hackers claim they were as much responsible for the software's development as companies like AT&T, Sun and IBM. For decades, these unofficial contributors have dissected the code and improved features. Studying Unix code is a routine requirement in many university computing courses.

Long-time open source advocate Eric Raymond claims feathers were ruffled only when Unix experts started channelling their knowledge into projects like Linux. Companies like SCO are now hurting financially and Linux users are copping the flack, he says.

"The drama here is not merely about money or the competing agendas of corporations, but about the Unix community's sense of ownership of its own work," Raymond writes in an online rebuttal to SCO's claims. "That community, and that sense of ownership, is exceptionally powerful."

Raymond points out that the Linux community has strong allies, such as IBM, which respects Unix hackers as "owners of their art".

Undaunted, SCO argues that it was only thanks to such allies — and the offending Unix code — that Linux ever became fit for enterprise use. In its early days, it claims, the free OS was the "software equivalent of a bicycle".

SCO has compared its actions to that of the US music industry, which is on a campaign to crack down on illegal copying of MP3 music files. However, some experts consider the issue a grey area, such as co-director of the AustLII online database of Australian court cases and legislation, Andrew Mowbray.

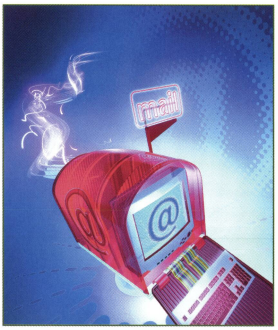
"If it's an adaptation of code or actual code, [IBM] could be liable, but if it's just something with Unix functionality then that's not enough. It's fairly clear under Australian law that copying functionality doesn't amount to infringement."

While Mowbray described Unix trade secrets as a "fragile thing to protect", the mud will still stick to the Linux community. By accepting contributions from unknown people, projects like Linux could be more at risk of inadvertently using code they don't have permission for.

SCO warns it plans to "take all actions necessary" to stop ongoing violations, and it has created a division to oversee an array of new programs to licence its core Unix code. And it gets weirder: one of the first to embrace the new campaign by buying a Unix licence was Microsoft.

William Maher

Mail muscle at a price



Paying for more grunt is becoming the only way to beat the email pinch.

The free ride isn't over for Webmail users, but it could start to cost those needing extra storage to cope with increasingly large messages. Tight restrictions on Webmail accounts are causing headaches as users send and receive large attachments, such as photos and work documents, and battle spam.

The size of free inboxes is the problem. They range from 2MB to 6MB for three of Australia's most popular Webmail providers, Telstra, Hotmail and Yahoo. The size of messages that can be sent or received is also capped.

"Because of the restrictions, none of my friends use Webmail for sending attachments such as funnies and photos, or e-greetings for special occasions, because they all seem to get sent back," said Hotmail user Linda Robinson. Spam was also a problem despite the filtering efforts of providers such as Hotmail.

"When you think about [the service] being free, I suppose we can't complain, but if we had to pay and got that amount of service, they wouldn't last very long, would they?"

Under plans introduced last month, Australian Hotmail users can pay $37.95 to increase the size of their inbox from 2MB to 10MB, and the size of messages they can send (see box, below right). Storage grows to 30MB for MSN group accounts, where Hotmail users can store photos and share documents.

Meanwhile, Yahoo is selling increased protection from spam. New Yahoo! Mail Plus packages range from US$30 a year for a 25MB inbox to US$60 for 100MB. Extra features include mail forwarding and the ability to send messages of up to 10MB.

Trying to find a free account with a large and spam-free inbox, traveller Amelia Howarth changed to Go.com. But she claims the site can't cope with large attachments and sometimes bounces emails with no explanation. "When I send more than six or seven emails in one session, they get bounced back, but not for about five days," she said. "My mates think I've been ignoring them, or Mum panics, thinking I've gone AWOL."

Howarth also relies on email for submitting job applications when visiting Australia from the United Kingdom, and server crashes have made this "really frustrating".

After almost five years in operation, local Webmail provider **freemail.com.au** recently told users they would have to pay $5 a month to keep their accounts. And all customer email addresses have been changed due to problems with junk mail. Such bandwidth and spam problems could drive interest in homegrown alternatives to services such as Hotmail and Yahoo.

Using a free downloadable mail script client such as SquirrelMail (**www.squirrelmail.org**) and space bought from Web hosting providers, individuals can set up their own personal Webmail service. The do-it-yourself approach can cost a lot more, but there are less restrictions on inboxes required to handle heavy workloads. For $27.50 a month, Oznet even provides a "Yahoo-like" mail system plus 50MB of storage. Another Australian Web hosting company, Digital Pacific, gives 30MB of storage for $9.90 per month, plus a $30 setup fee.

For sites like Yahoo and ninemsn (encompassing Hotmail), the Webmail changes are part of an ongoing effort to make money from the millions of visitors to their pages. ninemsn has the largest Web audience among local sites, and Hotmail has 3.9 million active accounts. "With 3.9 million people using this, even if only 1% [pay for extra storage], it's a good business," said ninemsn marketing manager Dominic Finnegan.

In Australia, Hotmail claims just over 40% of the Webmail market, ahead of Yahoo with 6% and Telstra on nearly 2% (Nielsen Netratings, March 2003). Research by ninemsn shows that the service is especially popular with people who don't have daily access to office mail accounts, such as the self-employed, job seekers and people at home. Webmail is also popular with holidaymakers on the move.

However, with messages being bounced, some are switching to other means of communicating online. Instant messaging is popular as an alternative to email for office gossip and can also be used to send messages to mobile phones. ninemsn claims to have had a "unique audience" of 2.6 million MSN Instant Messenger users in February this year.

Restrictions to free services like Webmail have been gradually added for some time as providers cope with tight budgets and bandwidth issues. Last year, Australian Hotmail users lost the ability to retrieve mail from several accounts for free. Other changes to the free Hotmail service include deletion of messages in the sent folder after 30 days. Some customers were reportedly caught off-guard last year when items were deleted without enough warning.

Yahoo has also made changes to its bandwidth-heavy services like Yahoo Photos and Yahoo Briefcase.

William Maher

Inboxing: commercial vs DIY

Provider	Hotmail Extra Storage	DIY-hosted with host-grid.com (using SquirrelMail)
Cost per year	$37.95	US$34.99 + $16.99 domain registration
Storage	10MB for inbox	1GB
Message size limit	2MB	None (depends on receiver's limit)
POP email support	Yes	Yes
Spam filters	Yes	Yes (with SquirrelMail plug-in)

Don't mention the war



nVidia puts the FX 5800 Ultra fiasco behind it and launches the 5900 Ultra.

The GeForce FX 5800 Ultra was intended to be the flagship of nVidia's new suite of cards, but it proved underwhelming. Its hot running temperature required an extravagant — and noisy — cooling solution. Adding insult to injury, the card was soon eclipsed in the speed stakes by ATI's Radeon 9800. nVidia cut the FX 5800's production run and shifted focus to its lower-speed value-oriented models, the 5200 and 5600.

"The bulk of the market isn't in the performance cards," observed nVidia's Derek Perez, noting that "the mainstream buy the mid-range cards." The company is hoping that its lower-priced offerings will sit well with those consumers looking for a cheap entry into DirectX 9.0 compatibility.

But just because nVidia continues to chase the budget dollar doesn't mean it has abandoned the high end. The company's stock price jumped 30% in May after it announced the NV35. Launched as the GeForce FX 5900 Ultra, the new card takes a leaf from the ATI Radeon's book, offering 256-bit RAM. nVidia is claiming that the new RAM, updated drivers and refined manufacturing practices have yielded a superior offering. *APC* witnessed the card in operation — it uses a slim heatsink and fan combination instead of a massive fan, so operating noise is down to the levels of a regular video card, but it still takes up a neighbouring PCI slot.

"We definitely learned from the experience," said senior product manager Todd Reddick. "We had some issues debuting on the 0.13 process that we're happy to say we have addressed. The FX 5900 is the result of refining the process."

But nVidia disagrees that its shift from raw speed to adding features hasn't gone down well with customers. And while initial benchmarks indicate that the FX 5900 Ultra is the new market leader, the "speed at all costs" mantra seems a thing of the past.

"The high end is mainly about bragging rights at the moment," said Perez. "What's better? Running a game at 300 frames per second with low detail or being able to run smoothly at 1,600 x 1,200 with 4x anti-aliasing?"

Justin Kranzl

Gates looks to TV for future Windows

Microsoft is making electronic TV guides, and revealing details about the next Windows.



The television is inspiring Microsoft in its latest bid to expand the role of the PC.

A bespoke version of Windows XP, tagged Media Centre Edition, powers custom-built PCs intended to be a single point for accessing videos, music, TV and DVD.

Already available in the US, the Australian launch of the platform has been delayed while the software giant tunes the technology to local TV stations.

Windows XP Media Centre Edition comes with its own special media codec and an interface for browsing and recording TV shows, as well as electronic TV guides which users click on to watch and record shows.

But the OS can't be launched here until it's adapted for Australia's PAL TV system, local channel frequencies and programming.

When Media Centre PCs do arrive, they'll be TV with a twist. PC manufacturers supply a TV-style remote control, complete with a Windows button. Like TiVO-style boxes, Windows Media Centre PCs store live shows in a buffer memory, meaning broadcasts can be paused and then play resumed without missing anything.

At the recent WinHEC hardware conference in the US, Microsoft indicated a closer partnership with manufacturers to drive new PC designs. The company is throwing itself into protocols for transferring music and video between devices, better DVD support, and a Microsoft set-top box that will turn the TV into a "window to the PC".

A prototype PC was unveiled incorporating features such as a 23in widescreen display with a mounted DVD player, as well as videoconferencing and telephone functions.

Additional details about Longhorn — the successor to Windows XP that's due sometime in 2005 — have also emerged. The next-gen OS will adopt a more modular architecture. Platform-specific editions such as Tablet PC and Media Centre will be created by adding components to the Longhorn core via a new Component Management Interface.

Desktop graphics will be enhanced using 3D graphics cards, which until now have been mostly for games. The technology allows desktop elements to rotate, warp and flutter when dragged. 3D cards are recommended for the "full Windows experience", although the OS will scale back to less fancy modes according to the user's video hardware.

Further, the interface will be re-designed for screens with a resolution of 120 or more dots per inch, providing a sharper image.

William Maher

Exchange: Rick Goodman



When you're trying to establish a games software company, you have to be foolhardy some of the time. *Rick Goodman*, co-creator/lead designer of the iconic Age of Empires, gives an insider's perspective.

It takes a lot of talent to gain recognition in the entertainment software industry, and a great deal more to be recognised as a legend. Yet that's the profile Rick Goodman holds among his peers. After four years at Lotus Development Corporation, MBA Goodman was ready for a change so he co-founded Ensemble Studios, authors of the Age of Empires series. Goodman has also run Stainless Steel Studios (**www.stainlesssteelstudios.com**) since its inception in 1997.

Despite his success, he is anything but complacent about any company's chances in the dog-eat-dog games software business. *APC* asked Goodman about the attraction of the industry, how coders and designers are treated, and what happens to those who fail.

Apart from the financial gains, what are the benefits of running or being the lead on your own projects?

I get a reward out of working at a small company with a small team where everybody knows each other real well and there aren't a whole lot of barriers to communication. I personally like the ability to get down and roll up my sleeves and work with everybody as a peer. In a small environment I'll pick up pizzas on Wednesday night, clean the tables after lunch, assemble the desks when they come in, and when the computers break I'll look at them. You have a very pure environment because no matter what happens during the development process, somebody has to pitch in. I like that . . . we're all here to get it done, and there's no political or hierarchical structure that would prevent you from pitching in and getting it done.

And the negatives? Is it hard to go from micromanaging tasks to relinquishing control in favour of overseeing the big picture?

One of the things you have to deal with is delegation. You go from a small team where you make decisions pertaining to your area of expertise… the team gets a little bit bigger over time and you have to rely on lots of other people to [effectively] do your job. That's a difficult thing because people don't always make the same decisions you'd make, and you have to rely on their expertise. I constantly find myself wanting to do it [myself] but that's unrealistic. Now I need to focus on certain areas because I cannot focus on all the areas.

How mobile are employees between different software companies? Could you ever contemplate working in another branch of software engineering, such as applications development?

I don't see myself leaving this industry. After seven years it's still as exciting for me as it was when I started. I don't know what that means, but it's probably a good sign! The thing that I notice about people in this industry in general is that they're fiercely loyal. We don't get new hires from other [games] companies, they come from other industries.

It seems that once you get into this industry, you tend to stay, and you're very loyal to the company you're with. I think that says a lot about our industry and how enjoyable it is and how much people like what they're doing. I've never lost anybody to go outside of the industry. I think it's unique in that sense.

Competition in the games industry is high and failures are commonplace. Does the element of risk deter new companies from entering?

It should. Absolutely. My experience is that the larger the organisation, the more experienced and knowledgeable they are. Also, the more risk-averse, the more deterred from doing something that is foolhardy. But then again, the younger and more foolhardy you are, the more likely the risk doesn't count at all. That pretty much represented my state of mind when I got into this business. I had no idea what it would entail, so I went off and helped start a company and hired people that had no idea what it entailed either!

It worked out for us, but we probably wouldn't have done it if we'd stopped to think about all the implications of what we were doing and how challenging it is, and how very few successful games get launched with an inexperienced team. So I'd say it's good to be foolish sometimes, but most of the time it's better to be wise.

Is it legal to . . .

stream content over the Internet?

While the IT Minister decided that Internet streaming did not constitute the legal definition of broadcasting, and the attendant legal obligations, the issue still requires caution. Like downloading copyright material, streaming of the same content requires permission from the copyright holder.

What of the companies whose projects fail? Do the programmers and designers who have worked on such projects move on or tend to remain in the industry?

Both. I have a network of developers I communicate with. The companies that tend to fail do so because it's a much more difficult task than most people understand. It's a very challenging thing, and it's a very high stress environment.

Your personal experiences can really shape your attitude. If you've had one or two bad experiences within the industry then you can come to the conclusion that this is not a good industry to be in. That's not saying it's a "good" or "bad" industry to be in, just that your personal experiences can really shape your attitude. I hope most people would have good experiences.

So the worker's experience is contingent on the ability of the company to put forward a coherent vision?

Ultimately, it comes down to whether [the product] succeeds or fails. In the game industry you can really run people's morale down quickly because you have to ask so much of them to succeed. That can work for you if the end result makes it worthwhile for everybody. But when you work so hard and you don't achieve the kind of success you were hoping to achieve, that's when a person's morale is likely to suffer.

Moving forward, what's the most crucial issue facing the industry in the next five years?

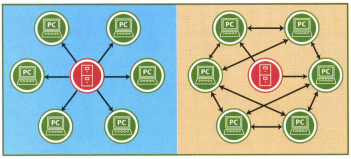
One thing I know is that if you look at the revenue in our industry and break it down into sequel- and non-sequel-based revenue, you can see that sequel-based revenue is getting larger and larger, and new brands are generating less and less. I'd say that was a huge challenge for any publisher or developer, because clearly if sequel revenue is 100% of the total then there won't be any new products entering the marketplace. And I think that would be a shame for publishers, developers and gamers. So we're going to have to figure out how to buck that trend. EOTE

Torrential downpour

As the DRM rhetoric increases, BitTorrent leads the way with a new approach to peer-to-peer file sharing.

Whether it's Linus Torvalds suggesting that digital rights management (DRM) technology be incorporated into Linux, or Microsoft head Steve Ballmer making it the subject of keynote speeches, the DRM debate is intensifying as new P2P applications open up file sharing to an increasingly larger audience.

BitTorrent (**http://bitconjurer.org/BitTorrent**) is similar to many P2P programs in that it allows users to download fragments of larger files and cobbles them together to make a whole. There are a few major differences, however. Files in BitTorrent's proprietary .TORRENT format are distributed via a Web page. When a user sees a desired file on a given page and selects it, the BitTorrent client takes over and commences downloading the file from the host. When another user connects and starts downloading the same file, the BitTorrent client not only downloads the file from the Web host, but from other users obtaining the file as well. This places less strain on the host and allows a faster transfer.



Fragmenting: *placing less strain on the host means a faster transfer.*

Unlike other P2P programs, the original BitTorrent doesn't download multiple files at once. "Experimental" versions exist which allow bandwidth manipulation and multiple file transfers, but it's the original version that is attracting the most interest. It pushes all available bandwidth — download and upload — towards transferring the current file. This makes for fast transfer speeds, but slows all inbound and outbound traffic to a crawl.

The ideologically "pure" approach of the likes of BitTorrent, with the necessity to upload as you download, means files can spread faster than KaZaA for example. KaZaA encourages people to share files, but its widespread hacked variant, KaZaAlite, allows users to de-activate uploading or sharing of files without any speed or access penalty.

As most P2P applications state, the less files shared, the less viable the service. Further, BitTorrent's Web-page-based distribution makes it even more of a headache. The minimal interaction required with the BitTorrent client opens up P2P-style sharing to a wider audience, especially those unfamiliar with, or not interested in, dedicated sharing programs.

P2P hitting the WWW mainstream is a prospect that pro-Internet regulators and those lobbying for mandatory adoption of DRM must dread — even if an increase in illicit file sharing makes the case for DRM stronger.

Justin Kranzl

Data Dump

Number crunch

Spam complaints to AOL since October 2002: **8 million**	Damages sought by AOL in latest anti-spam lawsuit: **US$10 million**
Searches Google processes daily: **more than 150 million**	Résumés Google receives daily: **1,500**
Cost per song from Apple's (entirely legal) iTunes Music Store: **US 99 cents**	Amount each pirate song could cost one Napster investor under a new lawsuit: **US$150,000**
ISPs in Australia in 1999: **750**	In 2002: **570**

(Source: Paul Budde Communication)

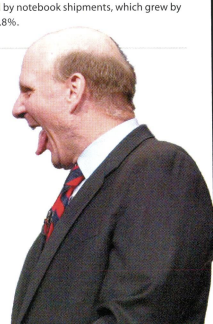
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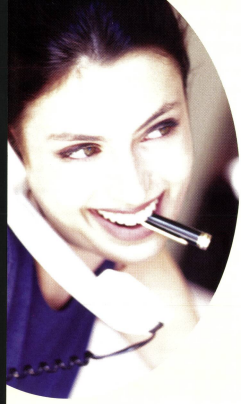
PC shipments to Australia in the first three months of 2003 hit more than half a million, figures from Gartner show. This is a 16.3% increase on the same period last year, in no small way helped by notebook shipments, which grew by a "staggering" 37.8%.

Quote file

"Linux itself is a clone of an operating system that is 20-plus years old. That's what it is."

Microsoft CEO Steve Ballmer downplays excitement about Linux in an interview with CNet. While fans argue that the non-centralised control of Linux is its strength, in Ballmer's eyes it's the penguin's big weakness.





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RaQ550	1gHz	512MB	2x80GB	$2,249	$7,490

Dell PowerEdge 1650 with Redhat Linux

model	RAM	hard drive	quarterly	annual
PIII 1.13 gHz	256MB	18GB	$2,500	$8,600
Dual PIII 1.13 gHz	512MB	2x18GB	$3,300	$11,300

Dell PowerEdge 1650 with Windows 2000

model	RAM	hard drive	quarterly	annual
PIII 1.13 gHz	256MB	18GB	$3,000	$10,200
Dual PIII 1.13 gHz	512MB	2x18GB	$4,000	$13,600

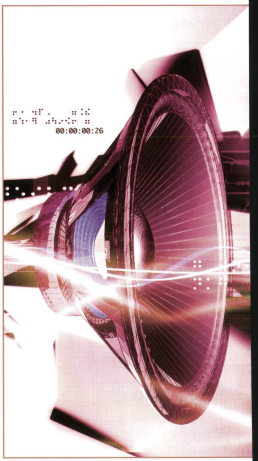
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Facing the music

Investigators are closing in on networks and individuals involved in the illegal trafficking of music online. *Garth Montgomery* reports.



Ben is typical of many students living on a university campus in regional Australia. Between lectures on teaching, and indulging at the bar, he logs his PC onto the uni network, opens his 10GB MP3 archive to fellow students, and looks around for what else is on offer.

"Ben" (not his real name) is no campus kingpin. He's like millions of students around the world who are oblivious to the fact that investigators want to put people like him in jail for music piracy. At the very least, they want to slap fines on him that make a HECS bill look like pocket money.

And the investigators are notching up victories against people trafficking music online. The strategy is to find where the music is being made available and sue both the network and the individuals involved.

Several recent events should be unsettling Ben at least as much as the cafeteria food. In February, Sony, EMI and Universal began proceedings against universities in Melbourne, Sydney and Tasmania for alleged copyright breaches on their computer networks. The unis are expected to give the Federal Court the names of students alleged to have traded music files illegally. The institutions initially resisted, citing concerns about student privacy, but that argument isn't expected to hold beer.

"Privacy has to be respected as an individual right, not as a defence for law-breakers," says Australian Recording Industry Association (ARIA) investigator Michael Speck. "I don't see a judge buying into a defence that says, 'But Your Honour, I'd like to complain about police issuing a warrant to get information about me, in investigating alleged criminal acts being committed by me.' It's done every day. That's how people are put in jail."

If Ben still has no hesitation about plucking the latest tunes from Web sites and P2P networks, he should have a think about certain events in March. Warrants were executed on Telstra and Perth-based ISP Eftel. Privacy concerns were wiped out by Section 282 of the Telecommunications Act which "does not prohibit a disclosure or use by a person of information or a document if the disclosure or use is reasonably necessary for the enforcement of the criminal law". Three students were arrested and charged with online music piracy. The hearing is set for this month.

It was the first time in the world that such charges had been laid. However, a Michigan Technological University student, Joseph Nievelt, has paid a much higher price for sharing music online than he would have by buying it legally. The Recording Industry Association of America sued Nievelt for running a similar network to Ben and his mates in Australia. He was ordered to pay the RIAA US$15,000, starting with $5,000 due on June 1, then US$3,333 a year for three years.

When *APC* asked Ben if he had heard about the Australian and American cases, he shrugs. "So what? It doesn't affect me."

Twelve ARIA investigators are monitoring online piracy in Australia. They can't be everywhere, so they pick their targets: mainly people swapping songs in volume. They comb blogs and chat sites, and generally mingle with punters looking for free music. Most of the sleuths are ex-police who view the work as no different to posing as drug dealers or buyers to catch offenders. "The only variation is that the Web is the crime scene," Speck says.

ARIA's mission is to close down anyone benefiting from online music who don't kick back a fee to the copyright owners. Many more investigations are in progress and Speck isn't expecting a rest in the near future.

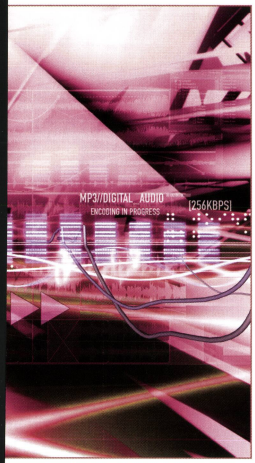
ARIA recently severed negotiations with lobbyists from the Internet Industry Association (IIA) because the music industry believes the Internet industry is benefiting from illegal trading of copyrighted material.

The IIA code of practice includes a take-down notice protocol. If ARIA sees an ISP hosting content with illegal files, it can ask that it be taken down. It's a different story in the US, where the Digital Millennium Copyright Act has a statutory mechanism for take-down notices to ISPs. It gives ISPs immunity for not being the direct copyright infringers, but the knowledge that someone else is infringing copyright on their network makes them equally liable if action isn't taken to remove the content.

The problem in Australia is that copyright is a civil right not determined by the courts, says IIA chief executive Peter Coroneos. "I could issue a take-down notice and later discover that you are not the true rights-holders. And the decentralised nature of P2P means a take-down regime has no bearing. The Government is looking to ensure that our members are not exposed to liability, with [legislation that provides] statutory immunity if they comply with industry codes."

Speck is sceptical about the Internet industry and claims its many moves are designed to protect fickle revenue streams and dodge laws rather than create viable business models. "The IIA's take-down notices protocol only benefits ISPs commercially," he says. "A large number of ISPs couldn't sustain their existing revenues if they weren't getting traffic from illegal recordings. A major Australian ISP admitted to us with a flashy PowerPoint presentation that 20% of its revenue comes from P2P traffic. When one-fifth of revenue comes from ripping off artists, we have to question whether they have a legitimate business model at all. The Pablo Escobar [former Colombian drug lord] defence of 'I never touched the stuff' has never worked."

While ARIA says copyright holders are sustaining the ISP business model, the IIA says the same thing about Internet companies propping up an old-world business model that has failed to cater for online markets. "We're starting to see a new model of copyright distribution with the iTunes experiment," Coroneos says. "Two million paid downloads in two weeks, compared with 'I'll sue you if



The steering committee behind the recently released *Enabling the Future* blueprint from federal communications minister Richard Alston's office urged the Government to be cautious. Echoing the IIA's calls, the committee warned that copyright owners' rights must be balanced with the needs of those developing new technologies.

To ARIA, evolving technology such as P2P — and associated financial beneficiaries such as ISPs and content hosts — are an example of how the copyright infringement process is morphing to avoid law enforcement, rather than adapting to legitimate business models.

"Post-Napster," says Speck, "P2P clients sprung up with technical and operational strategies capitalising on Napster's strength of community sharing but minimising their weaknesses, such as having a central server. What evolved was the physical and technical infrastructure of a P2P company that beats various legal propositions of copyright owners by being geographically dispersed.

"Now P2P companies are consistently striving to avoid being tied to one jurisdiction, so they can quickly set up in a new territory if they are pursued. They have decentralised nodes and bogus shelf companies outside jurisdictions where copyright law treaties exist.

"It's companies making money from someone else's work, and that's wrong."

"Privacy has to be respected as an individual right, not as a defence for law-breakers"

you don't abide by my business model.' We're saying to rights holders, re-engineer how you sell your product to global markets using the Internet infrastructure as a distribution channel. The old copyright economy is based on atoms — physical products that are shipped around. The new model is based on bits and doesn't recognise geographical boundaries. We'll do what's reasonable [to protect copyright holders] but they'll have to work with the Net, not against it."

On the surface, the Federal Government has taken a tough stance, with anti-piracy provisions in the Copyright Amendment Digital Agenda Act. It provides "higher criminal penalties where a digital infringement occurs and authorises the award of additional civil damages where an infringement includes digitisation of copyright material". Criminal penalties also apply to "tampering with conditions of use and information attached to material giving the details of the copyright owner (i.e. rights management information)".

The rights and wrongs are matters for the law enforcement sector to determine. Sources say the Department of Public Prosecutions doesn't want to waste resources on copyright abuse cases.

The three Australian students will appear this month in a magistrates court, where the offence carries a maximum sentence of two years in jail, compared to the five-year maximum in a federal court.

ARIA claims the case involves pirated music valued at about $60 million, but the students have been charged with one count of copyright infringement for one song.

The case has potentially global significance as it illustrates the challenges copyright owners face in the digital age. And P2P technology is changing almost daily. In the same week that KaZaA handled 230 million downloads, eclipsing ICQ as the most downloaded program at download.com, P2P tools such as eDonkey and Bit Torrent started gaining exposure as successors to KaZaA and Morpheus.

Despite the challenges, Speck's investigators are committed to going after rogue traders. ARIA has three other "major" cases advanced enough to have warrants executed in the near future, he says.

With luck, extending the iTunes experiment to the wider PC base, coupled with major record labels' plans to offer digital download services that people might actually use, will mean less call for Speck's vigilant crew.

Tuning in

Is the music industry finally caving in to popular opinion and opening up its catalogues to the Internet's millions of downloaders? While KaZaA shatters Net download records, competitors are making headway in their efforts to offer cheap, legal downloads without the hassle of trawling through sometimes patchy-quality, illegally ripped pirate collections.

Causing the most buzz is Apple's iTunes music store. Launched in late April, it carries songs from the five major labels at US 99 cents each and albums at US$9.99. There's no annual subscription charge and less heavy-handed restrictions on copying than many other online music stores. Songs can be burnt up to 10 times from the same playlist and transferred freely to Apple's iPod portable player. Though iTunes is only for Mac, a Windows version is reportedly on the way.

Though Apple's online music entry attracted a reported three million song downloads, Windows users have waited longer. Since Napster's fall, major industry-approved music portals like MusicNet and Pressplay have been set up, but have been criticised over subscription fees and other charges.

The Napster brand could appear again online after being purchased by Roxio recently. Of late, the company has also bought Pressplay — which carries music from Sony and Universal for US$10 a month — and announced plans to relaunch it under the Napster name.

Streaming media company RealNetworks has also bought Listen.com, which has dropped its prices to compete with iTunes. Song downloads are now US 79 cents, from a catalogue of more than 200,000 songs. The service also carries a US$10 monthly charge.

Meanwhile, Microsoft is working on a Windows-based method for controlling music downloads from online stores. Reports say a time-out feature will mean customers can transfer music files among portable devices and PCs, but consumers will be cut off if they don't pay monthly bills.

William Maher



Death of the domain name?

The Web seems to run like clockwork, except for all those clumsy Internet addresses. But, as *William Maher* says, our love of domains could be waning.

Surfing the Web is so easy. You connect, click on a hyperlink, then bang! A Web site appears. Most of us probably never stop to wonder how we manage to seamlessly click our way around the globe with only the odd pesky server crash. So, who the heck is running this thing? And how do they keep a worldwide jumble of networks online when we can barely manage a LAN?

Behind the million-dollar Web sites with their gaudy Flash animations, the job of keeping the Internet ticking over is no easy task. The nuts and bolts of the giant network, the Domain Name System (DNS), keeps millions of home pages humming away on monitors.

But it's also a global pain in the neck, responsible for years of arguments and heart-stopping technical embarrassments.

Now, some are wondering if we'll even bother with it all in the future. With the rise of Google, the theory is that people will let search engines do all the legwork rather than fiddle with clunky domain names. It's a complete about-face in attitude since the days of the dot com boom, when Netizens fought tooth and nail for the best names, and the likes of Bank of America shelled out US$3 million to protect precious sites from scheming cyber squatters.

"Rather than just typing in the domain to find something, people are using a directory service more and more," says Bruce Tonkin, chief technology officer for dot com registrar Melbourne IT. "If you're going to use the search engine, then it doesn't matter what the last three letters that follow the domain name are."

After all, who wants to bother remembering whether your favourite site uses dot net, dot org, dot com, or has a country code like dot au, when you can have a Web robot do the walking for you?

"I think what will happen increasingly with search engine technology is that it will become a lot more geography-specific. I could say, 'Who can deliver me a stapler in my area within the next 24 hours?'" predicts Tonkin. Yellow Pages, eat your heart out.

DOCTORING WHOIS

It's no wonder we're dreaming of a simpler way of surfing the Internet, given the hassles we've had with the current system. One of the most recent revelations is that the campaign to add extra domains — a plot of cyberspace for everyone — isn't going to plan.

The recent episode to set up the dot name domain sounded, in theory, like a surefire winner, but ended in a whimper, with a measly 85,633 registrations. Domain sellers were left scratching their heads; after all, who wouldn't want to name a Web site after themselves?

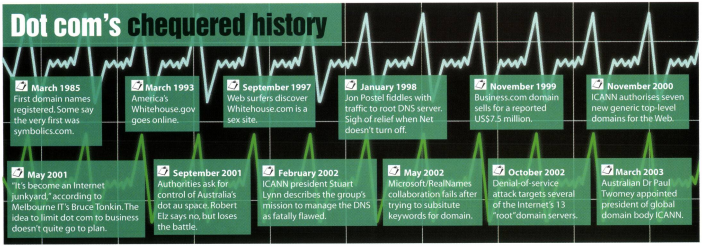
But there were catches, not least that putting your name up in lights on the Web is also a great way to get yourself noticed by spammers. Coupled with the fact that the three-part domains — peter.morgan.name for instance — could get a little confusing, the idea never caught on.

It's not the first time spam has caused domain owners to wince. Last year, the global Internet body ICANN admitted there was a problem with the WHOIS registration system, which allows prospective buyers to find out who owns which Web addresses. The issue? The service was a little *too* detailed, listing names, emails, telephone numbers, fax lines and in some cases even street addresses and suburbs. Spammers jumped for joy while Web site owners wondered why their email addresses were suddenly so popular. Not to be daunted, victims came up with their own solution — hiding their identities by supplying false registration details.

The result is that it's now harder to know who owns many of the Internet's home pages, because the Web's address book — the global WHOIS database — is filled with millions of useless entries. The president of Australia's AuDA domain body, Chris Disspain, is not amused: "You could, technically speaking, create a domain tomorrow in dot com and put down the registrar as Mickey Mouse, address Disney World, Florida."

However, spam doesn't set nerves racing like a full-scale security emergency. Late last year, some tech-heads wailed that the end was nigh after a data attack managed to hit seven of the 13 root servers for the global DNS system. The Internet didn't shut down, but the public was left wondering what might have been.

While some of the machines were being hastily moved to "mystery" locations, speculation ran rife. If the machines were so important, why were so many situated in the US, in one case two in the same building? What if the attack had been successful?



Writing for CNet, security expert Bob Alberti asked: "Was Tuesday's root DNS incident an isolated act of mischief, or a test run for a crippling distributed denial-of-service attack?" Managers of the root servers quickly played down fears. No-one would be pulling the plug on the Net just yet.

POSTEL'S SERVICE

It's not the first time hasty explanations have been needed to reassure the world's Web surfers. Back before the DNS was under the watchful eye of big, important bodies like ICANN, a geek named Jon Postel set hearts beating faster by reportedly doing some tinkering with the Net's über machine, the central DNS server.

While the US Department of Defense was involved in frantic late-night telephone calls to find out what was happening, Postel was calmly trying to "re-arrange" the flow of information to the DNS system's central server. The Net was never really in any danger, it was pointed out, but officials undoubtedly breathed a sigh of relief when browsers didn't go blank.

As for Postel, he described the whole drama as a simple "test". Fortunately for him, as well as being a curious tinker, he was also chief of the DNS authority at that time, and was widely regarded as the Father of the Internet. And as everyone knows, you get a certain amount of leeway for tyre kicking when you're the Internet's head geek.

The Postel "experiment" is just one of umpteen dramas that have played out behind the comfort of browser windows. Unbeknownst to many people tooling around the Net's highways and byways, struggles to wrestle control of the Net's domains from Postel-like figures were still going on as recently as 2001.

Australia's own reclusive Net expert, Robert Elz, bent heads out of shape when he refused to give up control of Australia's dot au domain, which he'd been handling since the 1980s. It was a bizarre incident, painted by the media as a stand-off between the long-haired, sandal-wearing Elz and the new breed of DNS bosses with their lawyers in tow.

The fight set the tone for a string of problems for the Net's overlords which continue to this day. Despite numerous efforts to please, ICANN has been widely panned in the media and by the Net community as "megalomaniacs", "shadowy" and "fatally flawed". There's even a Web site dedicated to exposing the gaffes of the controllers of the DNS: **www.icannwatch.org**.

More importantly, selling Web addresses hasn't turned into a licence to print money. In 2000, seven new domains (including dot name) were introduced to complement dot com, dot net and dot org. With top Web addresses earning million-dollar price tags, it seemed like a great idea at the time, but the exercise has taken on the feel of a used car sale.

Even the old hands at Melbourne IT copped egg on their faces, admitting they were disappointed with results from their $6.5 million investment in the dot biz caper. As for the others, Tonkin says addresses like dot aero and dot museum are "pretty invisible", while the dot pro domain didn't even get started. ICANN is reassessing the decision to add more Web addresses. "Is there a need for these new domains?" says Tonkin. "Basically, no. I think people had a kind of 'build it and they will come' approach and it hasn't worked."

While Google might make DNS squabbles less important, it's hard to see domains fading from view just yet. Since the dot com boom, they've entered pop culture via billboards, buses and TV advertisements.

Just remember that behind the magic of Web surfing, there's a lot of tyre kicking going on. Like any network, really.





Passing the buck

Copyright holders are suffering in the short-term, but the inability of pirates to resist the low-hanging fruit means it's the regular consumers who'll cop it in the end.

The television tuner piracy issue (page 15) has thrown a less-than-flattering light on the major players. On the one hand there's the pay TV providers Foxtel and Optus, whose offerings are being plundered. It's naïve to regard them as innocent victims of theft. Their negligence enables pirates to pull their product off the airwaves in the first place. Hackers happily point out that a Foxtel or Optus "disconnection" of cable TV usually consists of snipping a plug or pulling a few wires. Usually the signal remains live, presumably to make legitimate reconnection easier.

The trouble is they made it *too* easy. Anyone armed with a spare cable or some basic tools can effect a reconnection using a TV tuner card instead of a set-top box. Foxtel encrypts its signal, at least, but a freeware software utility puts paid to that.

When the issue came to light, Foxtel and Optus mouthed tired piracy platitudes before booting it squarely into the camp of the pay TV industry body, the Australian Subscription Television and Radio Association (ASTRA). It's irrelevant whether ASTRA prefers them to take this approach or not. In a market that needs every paying customer it can get, such indifference is astonishing.

ASTRA's operational efficiency or leadership finesse isn't in question here. It's the operators who control the infrastructure, employ staff and levy consumers for the cost of that service. When it comes time to explaining price rises, you can be sure that Foxtel and Optus will suddenly be a lot more willing to talk about the revenue-draining effect of piracy. These operators are the undisputed industry leaders in Australia. Yet for all their revenue and investment in the economy, they're only willing to employ a few fraud investigators and largely defer their authority to an industry organisation with a lot less clout.

And then there are the pirates. Using technical curiosity as a justification is no longer valid. The litany of excuses proffered by Internet users breaching copyright law is past its use-by date. Even if the law made concession for "evaluation", "backups", "24 hour use" or any of the other reasons cast about, nobody really believes those lines anymore.

There has been so much coverage of copyright violation, ignorance is not only no excuse, it's non-existent.

It's not enough to claim that piracy is a victimless crime, that pirates wouldn't pay for the service or goods they steal anyway, or that it's not as bad as stealing in "real life". The reality is that copyright violation is too widespread for authorities to ignore. And every time the likes of a TV tuner hacking story emerges, it adds weight to hardline calls for increased legislative intervention in the Internet and technology.

The masses aren't interested in "hack the planet" or "information must flow". The message they hear is how their cable TV subscriptions are subsidising half-smart guys with too much time on their hands. It might not be pretty and it might not be accurate, but the last time a Hacker had an open dialogue with middle Australia was in ABC re-runs of *Yes, Minister*.

To date, the Australian Government's blundering steps towards Internet regulation have drawn howls of derision locally and abroad. Terms like "luddite" and "broadband backwater" have replaced earlier praise of our online infrastructure and non-interventionist government policy.

And there's every indication that things will get worse. The litigation quagmire spawned in the US by copyright violations over the Internet has convinced politicians that they need to take action. Now it seems the legal blitzkrieg in the US is being replicated locally. And while striking fear into the hearts of students sharing music files sounds like good, sadistic fun, any actual benefit is yet to be proven.

The irony is that in the face of Digital Rights Management (DRM) and other restrictive technologies that see users relinquishing control of their systems, there's no compelling counter argument.

While striking fear into the hearts of students sharing music files sounds like good, sadistic fun, actual benefit is yet to be proven.

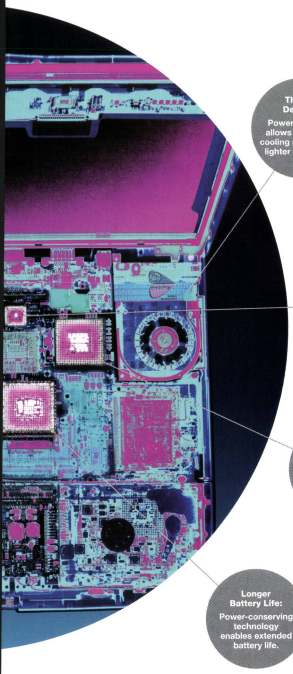
As much as Trustworthy Computing Platform Alliance (TCPA) members bleat on about system security, DRM is just as much a media management technology. In a time of record copyright violation, Voice over IP phreaking and hackers hopping aboard the free cable express, DRM becomes an attractive sell. For major media companies contemplating online ventures, it assumes "must-have" status.

In the future, as we boot our DRM-equipped Linux or Windows OS on DRM-inside hardware and authenticate ourselves and our software, don't just blame the ignorance of vendors and media companies. As you get put through the hoops to be granted the privilege of using the PC you paid for, spare a thought for the ratbags whose infringements led to this state of affairs.

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with Garth Montgomery



KaZaAm! Destra plan is genius

The stage is being set in Sydney for a showdown over global music piracy.

KaZaA has more than 230 million people using its software but no legitimate access to music libraries on a network awash with piracy. Meanwhile, local Net company Destra has relationships with the record companies that sanction access to the libraries. And slap me stupid if it doesn't also specialise in digital music distribution and content hosting. How convenient.

Is it possible these two companies could hook up and pull off the coup of the digital millennium? That is, drag the music industry — still kicking and screaming — online, to deliver tracks in a way people want them, legitimise peer-to-peer technology, and solve the global problem of music piracy. A problem which has robbed artists and led to a decline in music sales for three years in a row. And all from Sydney?

Destra boss Domenic Carosa thinks they can. Over an iced water, he championed the Aussie can-do spirit so strongly, he had Dispatch choking back tears. When he thumped the table and thundered platitudes like, "we're a f**king smart country! If we set our minds to it, we can do it", I swelled with jingoistic pride.

Carosa runs MP3.com.au and the second-biggest Web host in Australia, OzHosting. He also runs WiredEntertainment.com, a digital music wholesale business that encodes and distributes legitimate tracks to online retailers such as Sanity, HMV, Telstra, Yahoo and others.

Destra also runs MusicPoint.com.au, a B2B site that allows record companies to send new music direct to radio stations, and radio stations to add the music to their programming selector.

Yeah, so what? It means that if Destra can convince record companies to let it encode all new music and the back-catalogues, plus work out a business model that suits everyone so they can make loads of money out of us, then the infrastructure to offer music online will be firmly in place.

"There's an in-principle agreement for us to encode the back-catalogues [of all major record labels] and get access for selling online," says Carosa.

MP3.com.au has 5,000 tracks, mostly independent music, mostly crap. By Christmas, Carosa expects to have 200,000 commercial-grade, radio-friendly unit shifters. It's taken him five years to earn the trust of record companies. "Two years ago we were Satan. It was all 'Napster, MP3, you guys are pirates.' Now they realise MP3 doesn't mean piracy. The iTunes experiment really showed them they could make some money."

Australian Recording Industry Association (ARIA) piracy investigator Michael Speck is dubious about the so-called trust Destra is building with the record companies. "The motive is clearly to get access to the new-music libraries and back-catalogue," he says. "But it's interesting that they didn't put out a press release about their relationship with KaZaA."

Hold them horses. What does he mean? "It has registered KaZaA with its Web-hosting company, and it has access to the record company libraries. On top of that, its chairman is also chairman of the CD-pressing plant Regency Recordings. That's a pretty nice infrastructure in place.

"KaZaA [also] has detailed consumer behaviour patterns of its users, which are mercilessly sold to marketers."

Yeah, but the names are removed.

"Being nameless makes it *more* repugnant. They traffic pirated music that can't be controlled. And you couldn't get better traffic revenue than a P2P network, not to mention the advertising and a cut of any purchases made. Signing up KaZaA looks to me like they've been struck up the arse with a rainbow. For a listed company, I can't believe they aren't making more noise about it."

Always the sceptic, our Speck.

Dispatch says bring it on. Stuck in the mortgage belt, it's not practical for me to splurge on the latest Frenzal Rhomb or Placebo. But if I could get unlimited access to a licensed KaZaA network for, say, $20 a month, then that's already $240 a year the music industry doesn't get from me because once you buy a few CDs, with only two good songs on them that are played to death on the radio, you tend to shy away from the whole scam sooner or later.

Dispatch also welcomes any plans Destra might have to engage its relationship with the Regency pressing plant. Triple J's *Hottest 100* discs show that buying a snapshot of music not only gives you the best music for that moment, but it also has sentimental value. I'd think less of highly paid dot comers like Carosa — who'll be reaping gazillions from the likes of my consumer profile and associated revenues — if he *didn't* offer me a compilation CD with the day, week, month or year's top music, complete with pretty cover sleeve. Maybe even a cool holographic imaged CD, with compressed bonus promotional stuff like band interviews or, whatever.

Packaged up for, say, $10, I'd probably be sucked into buying loads of these on top of the $20 I'd be spending on access fees to cruise the licensed network. I could get behind that like a mid-air roundhouse kick to Agent Smith. Give me some of that action and I'd happily be a nameless marketing tool.

If I could get unlimited access to a licensed KaZaA network for, say, $20 a month, then that's already $240 a year the music industry doesn't get . . .

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Online shop of horrors

Ordering components online should be simple and pain-free, right?

Not if you placed an order with PC Advantage or E-Store.

Dear Watchdog,
In February I ordered a Samsung monitor from the PC Advantage Web site for $343.22. The company sent me an email confirming my order and gave me an exact delivery date. But that day came and went and there was no sign of my monitor.

I wrote five emails to PC Advantage's customer support — none of these were replied to. When I rang customer support the staff told me the delivery of my monitor would be delayed. I waited another two weeks and rang them again. The staff told me I would have to wait another week. At this stage I decided to cancel my order and ask for a refund. The staff told me the refund would go through that afternoon, but I still haven't received my refund. What kind of service is that?

Gregory Ng, via email

Gregory described the PC Advantage Web site as the "link into hell". The company's unacceptable delivery delays and failure to communicate with him prompted his demand for a refund. Watchdog spoke to PC Advantage's customer service officer, Brad Vincent, who responded on behalf of the company's general manager, Steven Spilly.

Dear Watchdog,
Mr Ng's emails were not replied to due to some isolated email interruption as a result of us moving offices (and changing MX records with our hosting company) at the time of his order.

The delays on his order were due to the manufacturer shifting the date of supply. Mr Ng was made aware he was entering a backorder situation at the time of order; unfortunately, several of the manufacturer's delivery dates were not met.

Mr Ng was fully refunded (as per his request) on 17 March, 2003. I suggest he was unaware of this at the time of writing as such a credit card refund can take up to two weeks to be processed by the banking network.

Brad Vincent, Customer Service PCAdvantage.com.au

This isn't the first time a company has used organisational upheaval as an excuse for poor customer support. A company's dedication to customer service can be measured by how communicative it is with its clientele. PC Advantage failed to answer five customer emails. Furthermore, any misunderstanding about Gregory's refund could have been rectified by letting him know of the bank's processing delay.

Spilly is no stranger to poor customer service and press coverage. He was once an owner of E-Store, an online PC retailer very similar to PC Advantage. In 2001, Spilly raised the ire of customers waiting for paid orders and suppliers when he placed the company into voluntary administration. Later in the year, Spilly sold his share in the company to US-based interests.

iPrimus you a refund

Dear Watchdog,
I recently tried to arrange through iPrimus four permanent ISDN connections for my head office and three branch office locations. However, these connections aren't permanent: every 24 hours iPrimus drops the connection to take a reading of the data transferred in that time period. And my ISDN routers don't re-connect up with iPrimus. I have asked for a refund of the setup fees for the useless connections (which cost $2,200) but the company has yet to refund me my costs.

Shane Wilkens, Geelong, Vic

Despite Shane's attempts to receive a refund from iPrimus, or Primus Telecom, it wasn't until the Telecommunications Industry Ombudsman (TIO) was brought in that the telco decided to compromise.

Then, Primus Telecom promptly resolved the matter. Noting that Shane had reconfigured his router and resolved the problem, it adopted a conciliatory tone.

"In the interests of good customer relations and in order to reach a prompt resolution to the matter, Primus Telecom has applied a credit of $1,295.32. Please note this should not be seen as a precedent.

"Primus Telecom anticipates that the application of the credit of $1,295.32 will bring this matter to a satisfactory close. Primus Telecom once again wishes to offer its apologies for any inconvenience this matter may have caused."

Although mollified by the outcome (which was "not necessarily to my full satisfaction"), Shane couldn't help feeling that the entire process should have been unnecessary. "It's extremely disappointing that a company with a customer relations team and a corporate case manager still can't help until forced to by the TIO," he said.

Administrators allowed E-Store to attempt to trade its way out of debt. The company continued to trade under managing director Greg Farley (who had just completed an ASIC-imposed four-year ban on trading) until April 2003.

In recent months angry readers have besieged Watchdog and other media outlets with complaints about E-Store. The company is now under investigation for possibly trading while insolvent.

Dear Watchdog,
I placed an order with E-Store in December 2002. I had to cancel soon after. The company said credit would be raised within two or three weeks. But by March this year — after a great deal of chasing — I still hadn't received credit or a refund.

All you get when you ring E-Store is a recorded telephone message. My bank will try to get a credit for me. I have also informed ASIC of this company.

Anthony Swan, via email

Anthony attached a detailed email log of his interactions with E-Store, culminating in the following email from sales and marketing manager Jeremy Heap on 24 March, 2003.

Anthony,
Unfortunately I am unable to authorise a credit at this point in time as the company has temporarily ceased trading. Therefore, your best course of action will be to contact your credit provider requesting a reversal of the funds debited.

We apologise for the inconvenience we have caused you.

Jeremy Heap, Sales and Marketing Manager E-Store Pty Ltd (subject to deed of company arrangement)

Meanwhile, as Anthony attempted to obtain his refund, E-Store continued to take new customer orders — and cash. Craig Sloots had the following experience.

Dear Watchdog,
At the end of February we placed an order for a CD-R from E-Store. Delivery was meant to take five to 10 days. The cost was promptly charged to our American Express account. But two weeks later the goods still hadn't arrived, and there was no update on the delivery time.

A request for an update resulted in an automated reply. Any calls to the advertised numbers resulted in a voice-recorded message, which simply read out the automated email response and then hung up.

As per the email's instructions, we subsequently sent through a request for cancellation of the goods. Of course, this was not replied to and, to date, there has been no sign of the goods or a credit to the American Express card.

Craig Sloots, Sydney, NSW

Craig attached documentation supporting his story, including the following email from E-Store.

Dear Valued E-Store Customer,
Thank you for your order inquiry. We understand your frustration in the late delivery of this order and apologise for any inconvenience which has been caused.

Currently E-Store is unable to process your order until a date to be advised. Your options in the interim are as follows:

1) Await our further advice on your order status.

2) If you do not wish to wait, you may cancel your order by sending an email to help@estore.com.au including your order number of which you wish to cancel.

3) If you choose option two above you can await a refund from E-Store or alternatively contact your credit provider requesting a reversal of the funds debited.

Once again, we apologise for any inconvenience caused.

E-Store Customer Service, E-Store Pty Ltd (subject to deed of company arrangement)

E-Store finally ceased trading on 9 April, 2003, when creditors put the company into liquidation. E-Store had defaulted on its March and April payments to creditors, sparking the final shutdown. Under the arrangement agreed to by the administrators and creditors, the company is obliged to pay $18,068 monthly until October 2003.

The competence and corporate governance of E-Store's owners and operators is one issue. But customer woes were exacerbated by the action of administrators Star Dean-Willcocks and the NSW Department of Fair Trading. The decision to allow the company to trade after Spilly put it into voluntary administration wouldn't have been appreciated by the PC consumers left out of pocket.

The NSW Department of Fair Trading began its investigation in January in response to customer complaints. But it could only monitor the growing mess.

The Department is hamstrung by legislation preventing it from warning consumers until a company has committed a proven illegal act.

Out of court

A modern-day David versus Goliath battle concluded in May when Telstra opted to settle out of court with a user. Victorian Robert MacMillan took the telco to the State's Magistrates Court after Telstra raised prices on its broadband service less than a month after he had signed on.

MacMillan argued that Telstra had breached its contract with him, and had engaged in misleading and deceptive conduct. He further raised the ante by claiming Telstra's price rises were a breach of State fair trading law, as the company advertised prices that it intended to raise in the immediate future.

The usual first stop for such complaints — the Telecommunications Industry Ombudsman — didn't regard MacMillan's complaint as valid. The TIO claimed it stemmed from broken promises made in Telstra's advertising, not its terms and conditions, and Telstra could not be held responsible.

Whether the Victorian Magistrates Court would have held the same view is debatable, given Telstra's settlement with MacMillan, the terms of which are confidential. Also unresolved is whether other users could mount the same argument and take action against the telco.

Contact us

WE WANT TO KNOW
how IT companies are really treating you. Write to: watchdog@apcmag.com or PO Box 4088, Sydney NSW 1028. Include your full contact details and any product information. All correspondence becomes the property of *APC* and is subject to editing.

APC does E3 in LA



The 2003 Electronic Entertainment Expo (E3) in Los Angeles has come and gone. An industry-only event unveiling the latest developments in games software and hardware, E3 is traditionally the barometer of what will be hot in the digital entertainment sector.

nVidia showcased its new video card, the GeForce FX 5900 Ultra. Its leading edge performance atoned for the sins of its father, the GeForce FX 5800. nVidia was so excited about the new card that it even lampooned the ill-fated predecessor in a spoof video (see this month's *APC* cover CD set). For more details on how nVidia hopes to rebound, see "Don't mention the war" in Need to Know.

Sony PSPocket

Meanwhile Sony, not content with holding leading market share with its PlayStation2 console, is planning an aggressive move into the handheld space with the PSPocket. No prototype units were on display for the device, due out in December 2004, but the hardware specification is compelling: MPEG-4 support, 3D sound, and polygonal rendering outputting to a 4.5in backlit screen. The resolution of 480 x 272 will be projected in a widescreen format, while the storage media is expected to peak at 1.8GB.

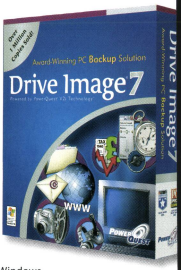
Sony was vague on the connectivity options for the handheld, and it will face stiff competition not only from other handheld gaming consoles, but by the real dark horse at this year's event: wireless gaming devices. PDAs equipped for games are nothing new, but the sophistication of mobile phone games has reached a new level. Nokia's N-Gage phone-cum-game handheld was highly visible. The question is, will consumers choose a larger phone for the sake of gaming?

Online connectivity

Entertainment software tracked more consistently than the hardware offerings. The future for consoles appears to be online, with every major

Continued under gatefold

Power to the people



PowerQuest is responsible for producing some of the tools we use most in the *APC* Labs. The company has just cranked its suite of lifecycle automation products through another iteration.

Drive Image 7 safeguards against accidental data loss by backing-up entire volumes to a hard disk. V2i Protector makes use of PowerQuests's proprietary Virtual Volume Imaging technology to push volume images down a network connection, which is perfect for a system administrator charged with rolling out a new OS deployment, or holding ultimate responsibility over corporate data.

New features found across the range of the latest releases include incremental backups and the ability to mount a backup volume as a read-only file system under Windows. Administrators can push an agent down to client machines to schedule complete and incremental backups in the background, without user intervention. Then, if a file is accidentally deleted from a client machine, the administrator can mount and share out a virtual volume from the archive.

Drive Image 7 is priced at US$69.95 and a full review will appear in the August issue of *APC*.

*nix

It's not uncommon to find operating systems with pricing for the academic market, but finding an OS created for students is another matter entirely. Yet that's the stated intent of College Linux. The distro came about after Professor David Costa of Switzerland's Robert Kennedy College found that the existing distributions didn't offer the flexibility required by his students. A team of four has managed the distribution's growth to date, Costa arguing that the smaller, paid team allows for tighter control of development.

Now at version 2.1, College Linux runs KDE as default, offering both KOffice and OpenOffice, project management tools, Flash and Java support, graphics and multimedia packages, and key to an academic environment, compatibility with Windows networks. More at *www.college.ch/linux/index.php*.

LNX-BBC (Linux Bootable Business Card) 2.1 joins the ranks of small, bootable Linux distributions worth a long look. Ideal for Linux sysadmins or mobile troubleshooters, the 48MB distro contains all the tools required for system diagnostics or temporary workstation use. Adopting the motto "leave no trace", the distribution can be run entirely off bootable media — including the business card-sized CDs that provided the inspiration for the distribution name. LNX-BBC differentiates itself from "Linux-on-a-CD" packages like Knoppix in that it's very much aimed at power Linux users. If the notion of packing Linux in your wallet appeals to you, head to *www.lnx-bbc.org*.



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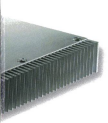
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developer seemingly offering online connectivity from Xbox and PlayStation2. PC titles Doom 3 and Half Life 2 remain the most hotly anticipated titles, with an Xbox port of Doom 3 and the upcoming Halo 2 also generating interest.

Electronic Arts was showcasing a build of the sequel to the best selling PC game of all time, The Sims 2. A new graphic engine and customisable appearances are just the tip of the iceberg. Also new in this version will be the ability to pick the starting age of your Sim, then play them all the way through to their death and then onto the following generation.

Office 2003 held up . . . again

Microsoft has released a third beta version of its productivity suite. Referring to the new beta as a "refresh" of the Office 2003 beta 2 version, Redmond has had to further push back its launch date of the retail product to accommodate the new beta release. Don't expect to see Office 2003 on the street until late September (that's 2003, we think).

It's not only competing XML-enabled suites from Sun and Corel that may cause headaches from a delayed release. The longer Microsoft waits, the more Licensing 6.0 adoptees it alienates. As time goes by, the two-year software assurance expiry date is bound to catch out more and more clients.

Emulation's a form of praise

APC readers will be familiar with Win4Lin, the handy app that enables a Linux box to fool Windows applications into running natively. A new version has just appeared on the NeTraverse site for US$59.95, boasting an improved installer, increased network support, and tweaked audio and video support. Win4Lin 5 is an absolute must-have for Linux junkies who still find themselves having to work with Windows-native apps. Support has been added for modern distros like Lindows, Xandros, Yoper and Gentoo, so it's perfect for any heterogeneous environment. Look to the August issue of *APC* for an in-depth review.



Win4Lin 5: *runs Windows apps on Linux.*

Spin me 'round

Remember when real music came on a shiny black disc with grooves? Check out Verbatim's Digital Vinyl CD-Rs, the ultimate accessory for the tech-head who remembers the days when purple haze meant something other than the smoke from an overheated motherboard.

These 80 minute/700MB discs come with bright, colour-coded labels (perfect for scrawling on with a black texta) and yes, they even have grooves just like the real thing. Sure, you don't get the authentic scratchiness that has vinyl buffs still hoarding their collections, but you can throw away the anti-static solution and felt brushes because these babies come with Verbatim's patented Azo Blue recording dye for quicker recording, plus a dual-layer, anti-scratch coating.

Now those Hendrix solos will retain headache-inducing clarity after the umpteenth press of the play button. Verbatim Australia sells the CD-R Vinyls in a 10-pack jewel case for $12.95; visit **www.verbatim.com.au** for more details.



For the retro look: *record your data on CD-R Vinyl.*

PS3 a step closer

The powerhouse chip for Sony's PlayStation3 console will be built in Nagasaki, Japan. Also known as a "supercomputer on a chip", or simply "Cell", it will be manufactured in a dedicated plant, on a leading edge fabrication line.

Sony will invest US$1.6 billion for the facility's construction. The need for a new facility is grounded in the design for the component.

To allow for the Cell's increased transistor count, the existing minimum width for chip circuitry, 90 nanometers, has been driven down to 65.

This is not just a Sony venture, the Cell project also involves major partners IBM and Toshiba, who have their own design for the chip. The plant is expected to commence production in late 2005 (at the earliest).

This means that the PlayStation3 could be in stores by around 2006.

End of the slide projector?

The next time one of your relatives returns from trekking in Nepal, swimming with dolphins in South Africa or bungee jumping in New Zealand and they invite you around to see their slides, you might want to politely point them to the $190 SanDisk Digital Photo Viewer. Essentially it's a set-top box that can display pictures on a television from a wide range of digital media cards. The idea is to take media cards directly from a digital camera and create a slideshow for friends and family. Unfortunately, it doesn't help you come up with a good excuse to avoid the boredom associated with sitting through the highlights of someone else's holiday.



Beta beat

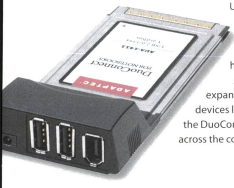
One of the all-time favourite arch platforms, WinZip 9.0, has made departure from the standard, Wi that potentially lock out some us the lockouts are likely to occur w two biggest selling points — enc

WinZip has made the move t encryption to replace the dated system. Encrypting your files wit require WinZip 9.0 beta (or later) releasing compatibility specifica utilities to open the files "later".

For keen file cruncher, there and improved compression usin function. The 64-bit file extensio both archives and the number o archive. But, and it's a big but, W version of WinZip that will be ab under the new compression sch

Head to **www.winzip.com/b** upgrades, the final product will b to registered users.

Connecting now . . .



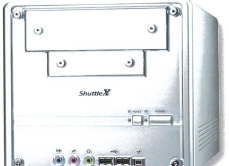
Got a new iPod or other external device, but no FireWire or USB 2.0 ports on your notebook to take advantage of the high-speed interface? Adaptec has slipped a new multi-format IO card into its range of PC card widgets, providing an inexpensive way to add high-speed data ports to your notebook.

APC has been a fan of Adaptec's range of PC card expansion options that provide connections to external storage devices like hard disks and CD-burners for a long time. At $229, the DuoConnect should easily find its way into notebook bags across the country.



Prepare for takeoff

Shuttle has been responsible for driving the mini box craze that is taking the IT world by storm. Check out last month's roundup (*APC*, June, page 64) for details on how professionally designed and constructed these micro PCs are. This small Taiwanese company has ramped up its releases in recent months, and has just announced the SN45G XPC. The 45G runs on an nForce 2 chipset and features support for 400MHz FSB Athlon CPUs running on the Barton core. There's no word on arrival time in Australia, but expect to be charged around $600 for a barebones box.



Cool runnings

quiet set-top

A clear trend in 2003 seems to be for PCs the living room. Savvy manufacturers hav owners want a quieter and sleeker form f work as set-top boxes. As we found out la Challenge (*APC* June, page 64), the small are a great foundation. But Hush Technol something special.

Looking more like a top-market CD o Hush Technologies' Mini-ITX PC is based platform. The makers have drastically cut parts and fan noise without creating too The objective? To make the PC as quiet a entertainment appliance.

Visit **www.hushtechnologies.co.uk** t fuss is about. The good news is that even i doesn't get distributed by a large local pla is on a healthy number of copies being ma hitting our shores from South-East Asian s



I need a notebook with a two hour repair service warranty.

For most businesses, down time is costly. That's why we provide a unique 2 hour Commitment Warranty Express Service** on all Acer notebooks - such as the TravelMate 284XC powered by the Mobile Intel® Pentium® 4 Processor - M. Simply take your notebook to any Acer repair centre in Australia or New Zealand** and we guarantee to have you up and running again in 2 hours or less. Acer is the only PC vendor to offer this service.



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If you purchase an Acer server such as the Altos G300 powered by the Intel® Pentium® 4 Processor, it is backed by Acer's 24 x 7 service hotline. So, in the unlikely event that you do encounter a problem, you can call anytime and one of our experienced technicians will help work through the problem with you on the spot.





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Ultra AGP II video technology (AGP 8x equivalent for 3D/2D video applications)
Microsoft® Windows® XP Professional
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Great value desktop

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Integrated 10/100M LAN – Broadband internet ready
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WS Group ACE199/APC

acer
Empowering People

Fair use? Not likely

As a huge music fan and someone who often purchases several CDs a month, I'm somewhat disappointed by our apparent ignorance of the ludicrously outdated copyright laws here in Australia, and specifically the absence of a US-style "fair-use" clause. In *APC* May's Epinions, readers confronted the problem of an "all consumers are criminals" pirate-tax on recordable media, and I couldn't agree more. However, in the May issue's Workshop section, *APC* also shows users how to build a digital home entertainment box, and fails to mention that no ordinary Australian is legally allowed to have a digital version of any copyrighted song or movie on their computer without permission from the copyright holder.


Workshop
Home entertaining

The gigabytes of music on my computer that were ripped from my personal CD collection for convenience are all in breach of Australia's copyright law, as are the handful of backups I've made of my older music CDs. I guess that means ARIA can come after all us evil consumers for harming their CD sales this year.

There's simply no provision in this country for Joe/Joanne Bloggs to do squat with any of his/her legally purchased music; you can't even burn a compilation CD of your own music for your own use! It's a harsh reality and not likely to change in the near future.

I would expect a magazine such as *APC* to mention to the reader that the home entertainment box you're showing us how to construct can't be used for any meaningful purpose in Australia without breaching our copyright laws.

Tom Dullemond
Brisbane, QLD

TIME FOR SOME TABLETS

I receive *APC* by mail each month and have just completed an upgrade based on your recent motherboard and graphics card reviews. You seem to have covered everything except the graphics tablet. While I have never used one, I hear they are an important tool to assist in photo editing. With the huge increase in the availability of low-priced digital cameras and all the software now available, some form of easy touch-up is necessary. I spend hours trying to get my pictures right with a mouse. I am sure it would be easier to draw lines around objects with a pen rather than the mouse.

I spent two weeks calling shops in Perth and only one store had any idea what a graphics tablet was. They said: "We can sell you one but we can't tell you anything about it." Needless to say, I haven't acquired one yet. There is more positive advice on the Web. I don't know that a tablet would make editing any easier but it would be nice to have your technical experts and the review team suss a few of them out. Many of your readers (including me) would appreciate some informed advice on the subject.

Bevan Sharpe
via email

Thanks for the feedback, Bevan. We'll tackle a roundup of graphics tablets in a forthcoming issue, so stay tuned.

BONE OF CONTENTION

A small quibble with your otherwise excellent survey of broadband ISP's (APC June page 86). Why did your table summary not have a column for "contention ratio", after you made so much (page 88-90) of ADSL's dirty little secret — that if too many people are sucking on the pipe, the service speed can drop below that of a dialup service?

Browsing Telstra's Web site, I came across the link **www.telstra.com.au/products/product.cfm?segment_id=3&group_id=311&prod_id=5546&mode=catalogue**.

If you look under the two-way satellite service, you will come across the quote: "Broadband means that customers have options of connection speeds of more than 128Kbit/s." I remember a recent article in *APC*, which explored the different definitions of "broadband" in the industry.

With this discovery, it seems that Telstra is content to define it as twice the speed of dialup. Obviously, this will help in the official tally of Telstra customers who have "broadband".

Evan Lau
via email

Evan's keen-eyed detection of Telstra's interpretation of what constitutes broadband secures him this month's best-letter prize.

Letter of the month

EVAN'S PRIZE IS Microsoft's Wireless Optical Desktop. Valued at $229.95, it's guaranteed to communicate with his PC much faster than satellite Internet.



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Wireless connectivity and some features may require you to purchase additional software, services or external hardware. Availability of public wireless LAN access points limited. System performance measured by MobileMark® 2002. System performance, battery life, wireless performance and functionality will vary depending on your specific hardware and software configurations. Intel, Pentium, Intel Inside logo, and Intel Centrino are registered trademarks or trademarks of Intel Corporation or its subsidiaries in the United States and other countries. Microsoft and Windows are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries. All product information is correct at time of printing.

FJT0080_P1

My business involves setting up other businesses to use video over the Internet, so I'm perhaps closer to those for whom this is a business-critical issue. Nonetheless, it's the single most common complaint I hear about ADSL: that broadband speed often drops away almost to nothing, and with Mr Murphy's help, always at just the most critical moment.

A comparison of ISPs by the number of clients each allows to suck on each pipe would not guarantee choosing a consistently high-speed service — a modest number of contenders won't help much if the others are all leeches simultaneously leeching — but at least it improves the odds.

Greg Carman,
via email

Author of the broadband feature, Dan Warne, responds: Comindico was forthcoming with its contention ratio because the company was keen to pre-empt criticism that its cheap unlimited products would quickly become overloaded.

However, in most cases, an ISP's contention ratio is a jealously guarded, competitive secret. Telecommunications regulators have discussed making disclosure of contention ratio information mandatory for ISPs, and while no policy has yet been ratified, APC hopes to see more disclosure in the future.

ON THE SUBJECT OF SPAM ...

I think what will eventually happen is that the ISPs will have to charge a nominal fee say, 1 or 5 cents for each email. This will stop the spammers sending millions of emails. The ISPs can rebate any fees of the monthly bills, create new marketing plans or (more cynically) just keep the money.

It would be best for ISPs do this before the government does it for them (and probably keeps the money).

It's a sign of society that any free methods of communications will attract advertisers. If phone calls or postage stamps were free, we would be deluged with advertising material. The impost on business will just be absorbed into postage and phone calls.

In any case, there are less postage and phone calls anyway because of emails. Now things will be evened out.

Daryl Cheshire
Melbourne, VIC

SLIPPING THROUGH THE CRACKS

I am a sight-handicapped person (on a Blind Pension) who has been involved in the IT arena in various Commonwealth Departments since 1980. Could you please tell me where all the IT jobs have gone?

I hold Certificate III in IT, Software Applications, Certificate IV in Web site Design and Production, and Certificate IV Workplace Training and Assessment.

I have been unemployed since 1995, when I was retrenched from a Commonwealth Government Department position.

In frustration with CentreLink and other local employment organisations, I approached the Royal Blind Society for assistance in 1999. Surprisingly, they have very little experience with people like myself, who are the exception not the rule in the way they utilise what's left of their eyesight. What would you really expect from someone who is blind in the left eye, and has less than 20% vision in their right eye?

If you think "Not very much", you're wrong! I was employed by the Commonwealth on the same basis as everyone else. I had no special dispensation — nor did I ask for any. I was able to work, for all intents and purposes, as a non-handicapped person, and I did it for more than 20 years! Four years down the track with the NSW Royal Blind Society (RBS), I still have absolutely nothing to show in relation to achieving my goal of part-time employment within the IT or associated industries.

The RBS admitted that they could not really help me, as I had completed all my own training, and my qualifications put me right out of their traditional expertise area (basket weaving and Braille telephone exchanges for instance).

At this point I have virtually given up. If I am to believe the statistics, more than 50% of the population has defective vision of one kind or another, from mild to extreme short-sightedness through to colour-blindness.

Visual impairment alone accounts for the highest proportion of the overall segment of physically handicapped people in Australia.

From a sales and user perspective, this would translate into a sizeable chunk of the consumer electronics market in this country, and others. It would encompass items including computer hardware, peripherals, software applications and associated consumer electronics.

Have your say

We welcome your comments and suggestions. Send email to: **epinions@apcmag.com** or write to: **Epinions, *APC* Magazine, PO Box 4088, Sydney NSW 1028**. All correspondence becomes the property of APC and is subject to editing.

Agenda:
your place to vent

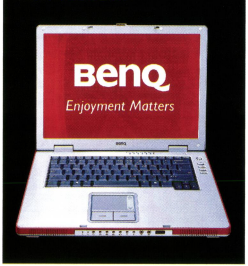
Do any other iPrimus users notice the severe slowdown in server speed when *Big Brother* hits the airwaves? As a loyal customer of iPrimus for over three years, I would expect the ISP to increase capacity during this busy time. Alas, it seems it makes its usual customers suffer while it uses the above-average download stats to make itself look good. Based on previous experience, iPrimus dialup customers can expect connection speeds to halve or worse for the next few months.

And another thing. Having just bought the May *APC* issue, which dealt with PC security and unsolicited emails, spyware and unrequested downloads, I was amazed to fire up IE6 (which I installed from your cover CD) and find that my home page had been changed to the *APC* site without me being asked!

Rod Phillips
via email

Prize Pit

The winner of the May subscription competition is J. Coleman of Chisholm, ACT, who has won a BenQ Joybook 8000 notebook which is valued at $3,999.



If you really want to put this in perspective, just look at the latest initiatives for Internet "Accessibility" on the W3C Web site. I sincerely hope that you can come up with a couple of suggestions for me.

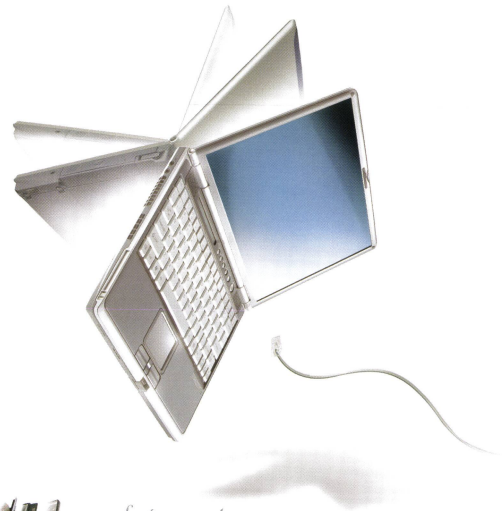
Cliff Perrin
via email

Has anyone else faced similar access issues? Any suggestions or leads for Cliff will be passed onto him via email.

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Modular bay is hot swappable with optical disk drives, USB FDD bay unit, PC card slot, 2nd battery and weight saver

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Wireless connectivity and some features may require you to purchase additional software, services or external hardware. Availability of public wireless LAN access points limited. System performance measured by MobileMark® 2002. System performance, battery life, wireless performance and functionality will vary depending on your specific hardware and software configurations. Intel, Pentium, Intel Inside logo, and Intel Centrino are registered trademarks or trademarks of Intel Corporation or its subsidiaries in the United States and other countries. Microsoft and Windows are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries. All product information is correct at time of printing.

FJT0080_P2



INTEL® CENTRINO™ MOBILE TECHNOLOGY: *Intel® Pentium® M Processor 1.60GHz; Intel® PRO/Wireless Network Connection 802.11b; Intel® 855M Chipset Family/60GB HDD/DVD multi-drive/512MB RAM/15"UXGA TFT screen/ATI Mobility™ Radeon™ 9000 graphics controller/SD Media slot/5.3 hours battery life (may vary depending on configuration, applications, power management settings and features utilised)/7.8 hours with second SelectBay battery /2.8kg.* Intel, the Intel Inside logo and Centrino are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries.



The wireless Tecra S1. Because you rarely have time to stop and recharge.

OBSERVATION: A wireless notebook can do wonders for your personal productivity. Especially when you spend half your day in meetings. But that's academic if your battery can't go the distance.

OBJECTIVE: Build a powerful desktop-replacement notebook based on the new Intel® Centrino™ mobile technology. Design it specifically for corporate users and the way they work.

RESULT: The Tecra S1 has all the features you could want in a desktop replacement (15" screen, DVD read/write etc). It also has integrated wireless LAN, so you can access the corporate network or the internet from anywhere within range of a Wi-Fi hub or public hotspot. Finally, the Tecra S1 is equipped with a battery that has 50% more capacity than normal. It delivers a solid five hours of life. And that means you can stay connected and productive through long meetings without worrying about your notebook turning into an expensive paperweight. That's not just good for productivity, it's good for your confidence too.

ACTION: See your nearest Toshiba Authorised Reseller, visit www.isd.toshiba.com.au or you can call 13 30 70 for more information.

TOSHIBA

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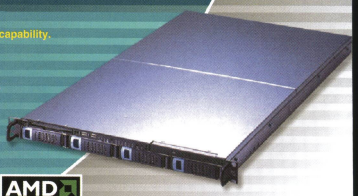
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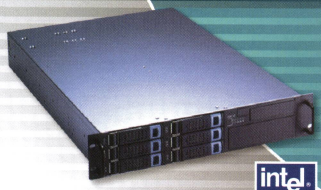


- 400W Slim Power Supply.
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- 4GB ECC Registered DDR RAM(support up to 12GB ECC Registered DDR RAM
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On Test

Detailed product reviews and comparisons



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Perfect for the notebook user, with plenty more features than an onboard sound processor.

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You thought a desktop colour laser printer under $2,000 was impossible? Think again.



56 Samsung SyncMaster 152x

Save on desktop space and max out on style with Samsung's latest 15in LCD.

58 Apple iPod

The new super-slim Apple iPod is elegance and simplicity at its best.



58 Sony DRU510A DVD+/-RW

Sony's latest internal drive is miles ahead of the pack, with support for both DVD+ and DVD- media.

60 Alias|Wavefront Maya 5

From the desktop to Hollywood blockbusters, all you need is Maya, time and deep pockets.



60 Blender 2.27

But if you don't have those deep pockets, Blender is your best bet for professional animations.

apc LABS Challenges

Sub-$2,000 systems

Two grand is enough to buy a pretty solid machine these days, but don't be fooled by some vendors' gimmicks.

64



Serial ATA hard drives

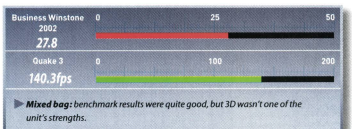
They're here, but not ready for prime time. See why none of these drives won an Editor's Choice award.

78





▶ ***One-stop appliance:*** *the Xperian combines a PC with a TV, DVD, stereo and radio.*



▶ ***Mixed bag:*** *benchmark results were quite good, but 3D wasn't one of the unit's strengths.*

Lounging sweet

Hi-Grade pushes the PC into the living room with a complete home entertainment system.

In the last 12 months the PC has broken out of the office and study as a work and gaming appliance, and moved into other parts of the house. Some are useful, such as a box that doubles as an entertainment centre; others are forays into the absurd, like Internet-ready washing machines and fridges.

Thankfully, Hi-Grade's Xperian belongs in the former category.

MYRIAD MULTIMEDIA

After nearly a year's availability in the US, local touchdown of Media Centre PCs running Windows XP Media Centre Edition is due in the coming months. However, popular European brand Hi-Grade isn't waiting around.

The company's Xperian is a desktop PC that doubles as a music/DVD player as well as a TV. But unlike the Media Centre PCs expected from the likes of HP and Acer, Hi-Grade's uses a full-blown version of Windows XP Professional. In fact, the Xperian works like a regular desktop PC when the multimedia features aren't in use.

A row of buttons along the top of the wireless keyboard enables switching between FM radio, TV/VCR, DVD/VCD, CD/MP3 and regular PC functions. Specific applications include AVPC for MP3, WinDVD 4 for DVD playback and WinFast PVR for TV.

An infra-red remote switches between functions and controls the software. The machine can be turned on with the remote or the keyboard, but the remote is of course better suited to lounge-room channel flipping.

SPEC-TACULAR

At the heart of the machine is a regular 2.53GHz Pentium 4 mated to 512MB of RAM. Matched with a 60GB hard disk, this provides enough space for recording TV programs in the short term. However, serious TV junkies will eventually need to buy themselves additional storage.

Under benchmarking, the Xperian performed surprisingly well, achieving a score of 27.8 in Business Winstone 2002. Unfortunately, it isn't built with gaming in mind and it struggled in our 3D tests despite the inclusion of a Radeon Mobility 9000. The TFT panel runs at a native resolution of 1,280 x 1,024 pixels, which is ample for the 17in screen, and DVDs display clearly without noticeable blurring or ghosting.

The back panel of the unit has several ports and connectors, including four USB ports, modem and Ethernet, an SD slot, S-Video and RCA connectors. The aerial included is analogue, so the Xperian can't tune into digital channels.

Also, the only expansion port is a single PC card slot, which would make it difficult to add to the machine down the track. This renders it similar to other household appliances and represents a step away from mainstream computing philosophy.

INSTANT REPLAY

Turn the machine on with a regular DVD movie in the drive and it plays automatically without booting the OS. The same goes for the TV, CD, MP3 and FM radio playback. You are up and running in around 15 seconds without even entering Windows. This is a big advantage for anyone who's ever run a PC in the lounge room and struggled to control the pointer on the screen from a significant distance.

Hi-Grade hasn't finalised pricing, but expect the Xperian to come in three models, with the mid-range unit at about $3,750. The company says a 19in model will follow in the third quarter, with a monster 21in unit to hit the shelves at the end of the year. There's no word yet on pricing for these products.

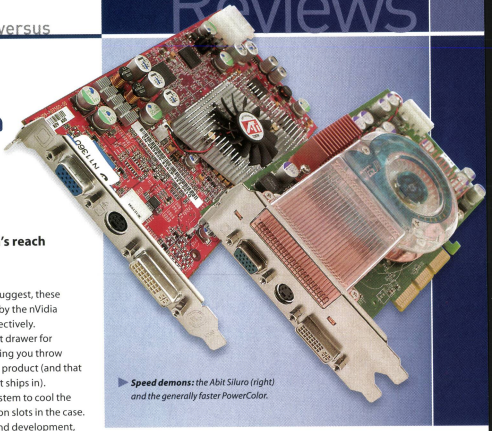
The Xperian is a unique machine, not hobbled by an overly-restrictive OS (which constrains the user to lounge room-type activities). The independent access to TV, DVD, CD and FM is a definite plus compared to rolling your own PC/TV solution.

The Xperian is roughly the cost of a dedicated CRT TV with flat-panelled monitor, but a comparative entertainment system in components would cost more.

Matt Overington

Details	
Contact	Hi-Grade
Phone	1800 770 550
Online	www.higrade.com.au
Price	Around $3,750
✓	Simple, elegant design.
✗	Relatively expensive.
Verdict	●●●●○

Lose the Force



Speed demons: *the Abit Siluro (right) and the generally faster PowerColor.*

ATI keeps the speed crown out of nVidia's reach with the PowerColor ATI Radeon 9800.

As the full names of the Abit Siluro and PowerColor suggest, these latest additions to the graphics market are powered by the nVidia GeForceFX 5800 Ultra and ATI Radeon 9800 Pro respectively.

Abit's limited-edition Siluro model has a slide-out drawer for cables, CDs and manuals — this isn't the sort packaging you throw away. It all adds to the feeling of buying a well-made product (and that includes the exclusive air of the black, wooden case it ships in).

The Siluro has Abit's Outside Thermal Exhaust System to cool the GPU and, like other FX cards, it takes up two expansion slots in the case. Abit has obviously invested some serious research and development, and the whole unit is much lighter than previous cards. The problem of excessive noise has also been addressed; the Siluro now sounds more like a Hoover than a hurricane. That's still much louder than we'd like, but it's a step in the right direction. And gone are the spikes in fan speed when performing GPU-intensive tasks (often a distraction from game play and other graphics-rich tasks).

Compared to the Siluro, the Radeon cooling system looks miniscule, with a standard heatsink that doesn't even cover the memory chips. Its less power-hungry design allows blisteringly fast performance without the need for a slot-eating cooling system like the Siluro's encased fan and air duct.

BETTER ARCHITECTURE

Speed gains in the Radeon architecture come from improvements in three key areas. Hyper Z III+ offers better handling of stencil buffer data than Hyper Z III, and this is expected to substantially improve the next generation of games running the Doom 3 engine. Smartshader, which provides cinematic-quality lighting effects, is now in version 2.1, taking the full hardware implementation of DirectX 9 a step further with F-buffer. F-buffer conserves horsepower by doing multiple passes only on pixels that need them. Smoothvision is also updated and has memory-controller optimisation for anti-aliasing.

The PowerColor offers excellent value as it comes with seven game titles, including full versions of Commanche and Summoner.

Both cards support DirectX 9 and Open GL, although the Siluro supports only up to OpenGL 1.4, as well as 8X AGP. Both have 128MB of memory, but the 5800 Ultra contains the faster 500MHz DDR-II, which is effectively 1GHz. The 9800 Pro's 340MHz DDR (effectively 680MHz) works with a 256-bit memory interface. The GeForce FX uses 128-bit architecture.

These differences give the Radeon a memory bandwidth of 21.8GB/s compared with only 16GB/s in the 5800 Ultra. Both cards have increased the fill rate to eight pixels per clock cycle, doubling the performance of previous cards.

The two cards were tested on an Athlon XP 3200+ system with 512MB of DDR400 RAM and an 80GB hard drive.

The Siluro put in a respectable performance with 3DMark2001, clocking 14,903, but the PowerColor blew it out of the water with 16,854.

In Quake 3 testing the roles were reversed. The Siluro pumping out 294fps at 1,024 x 768 compared to the Radeon's 284.6fps.

While the nVidia-based card is reasonable, our head-to-head results show that ATI's slimmer and less power-hungry Radeon 9800 is faster. Its performance advantage averaged at about 13% across the board (with the exception of the Quake 3 testing). But benchmark results aren't everything. In real-world viewing of rendered material, both cards did an excellent job at creating smooth, lifelike results.

Given the small price difference, the Radeon-based PowerColour would be the smarter choice.

Paul Robinson

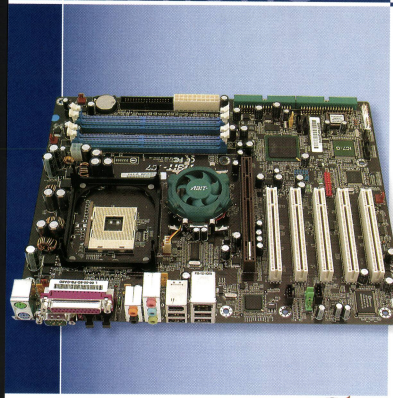
Details: Abit Siluro

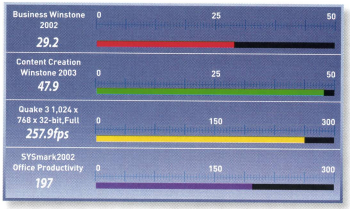
Contact	Altech Computers
Phone	(02) 9735 5685
Online	www.altech.com.au
Price	$740
Quake 3 (fps @ 1024 x 768 x 16)	100 — 294 — 300
3DMark2001	10K — 14,903 — 20K
✔	Quieter than previous FX cards.
✖	Only supports Open GL 1.4.
Verdict	●●●●○

Details: PowerColor

apc EDITOR'S CHOICE JUL 2003

Contact	Altech Computers
Phone	(02) 9735 5685
Online	www.altech.com.au
Price	$800
Quake 3 (fps @ 1024 x 768 x 16)	100 — 284.6 — 300
3DMark2001	10K — 16,854 — 20K
✔	Superior performance; supports Open GL 2.0.
✖	More expensive.
Verdict	●●●●◐





▶ ***Souped up:*** *the Abit IC7-G motherboard has everything a speed demon could want.*

Abit of alright



Here's a solid motherboard that doesn't turn up its toes when you crank up the frequency.

Abit boards are popular with hardcore tweakers because they handle overclocking so well. In fact, the fastest x86-based, single-processor desktop computer in the world — demonstrated at CeBIT 2003 — was built by Abit and based on the IC7-G platform with a 3GHz Pentium 4 CPU running at 4060.34MHz.

The IC7 is built on Intel's i875 chipset, mated with a ICH5R Northbridge located under a heatsink and fan near the single 478-pin ZIF socket. The chipset, formerly known as Canterwood, provides support for Hyper-Threaded Pentium 4 and 478-pin Celeron CPUs. There's plenty of room around the CPU slot, and ample space to fit a massive heatsink — an important consideration on a board destined to be overclocked. Four colour-coded DDR SDRAM slots are also provided to make dual-channel RAM easier to install.

One design quirk we like is Abit's placement of the IDE connectors parallel to the face of the motherboard. This enables the drive cables to be routed as far from the CPU as possible, which leads to a more efficient airflow inside a case.

Abit has made full use of the ICH5R Northbridge chip, and as a result the rear panel includes just about every type of port imaginable in a modern PC. On the roster: PS/2 keyboard and mouse, parallel, serial, FireWire, Gigabit Ethernet, audio, S/PDIF optical, and four USB 2.0 connectors.

Abit motherboards have a loyal following thanks to their overclocker-friendly reputation, and everything about the IC7-G does scream speed. Even the Phoenix AwardBIOS has been tweaked by ABIT to add individual performance settings not found in other BIOSes. Plus, the SoftMenu interface is a definite boon for the power hungry.

The SoftMenu application is one of the best tools available for overclocking. A single interface enables the manipulation of CPU and system speeds, tweak voltages and monitor temperatures. It's rare to find a motherboard that gives users such fine control over the individual system components, and it's sure to please power users too.

CPU FSB, the N/B Strap, the DRAM FSB ratio and the AGP FSB ratio settings are all adjustable. The CPU FSB frequencies range from 100 to 300MHz, but the settings affect the AGP and PCI buses along with the system memory.

It's up to the user to clock-back the PCI and AGP buses to keep them in step with other devices in a system that's undergone tweaking. A range of multiplier settings are on hand, but before you get your hopes up, remember that the Pentium 4 CPU's multipliers are locked.

OVERCLOCKERS' DREAM

We tested the IC7-G with a 3GHz Northwood II Pentium 4, running at a bus speed of 800MHz. With high expectations for the benchmarking scores, we examined its overclockability to see how far we could crank up the CPU voltage before the system refused to boot.

Although we've heard stories of the 3GHz Pentium 4 booting with a core voltage of over 1.8v, our system failed its POST when clocked over 1.725v. While this doesn't sound *that* significant, it's still a boost of 600MHz. However, the system is unstable at that speed and we needed to drop its core voltage to 1.70v before we could complete any benchmarks. Despite users being able to crank up the core voltage to 1.9v, why does the RAM voltage peak at 2.8v? Some overclockers are calling for more than 3v to the RAM banks, which is currently achievable only via voltage mods.

For a mobo that can take what's dished out, you'd be hard-pressed to find a better PC drivetrain than the IC7-G.

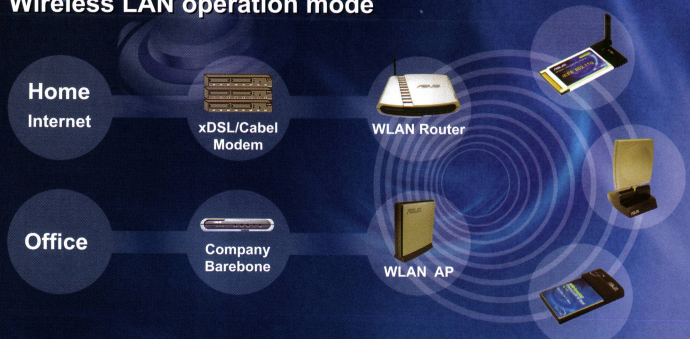
Matthew Overington

Details	
Contact	Altech
Phone	(02) 9735 5655
Online	www.altech.com.au
Price	$440
✔	Fast, full-featured board.
✖	A little pricey.
Verdict	●●●●○

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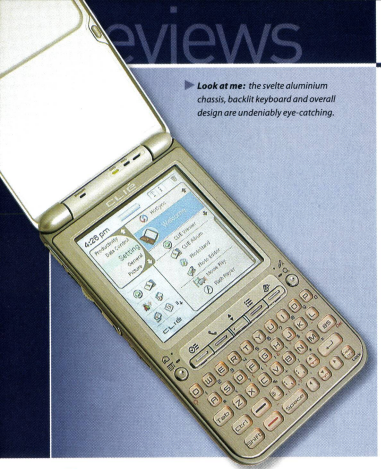
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Look at me: *the svelte aluminium chassis, backlit keyboard and overall design are undeniably eye-catching.*

Fun on the run

Despite a few sour notes, Sony hits the sweet spot with its latest Palm OS 5 handheld.

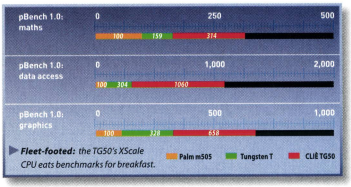
Want to turn downtime into playtime? The CLIÉ TG50 swings both ways with an appealing blend of productivity *and* entertainment. The carefully measured feature set eschews indulgences, such as built-in cameras and flip-panel screens, giving the TG50 a price point that sets it head-to-head against Palm's Tungsten T. Yet it outguns the T in many departments, starting with a 200MHz Intel XScale processor that bested the T's 145MHz Texas Instruments engine in every benchmark.

The TG50 enjoys a noticeable speed edge in everyday operations, like launching apps, searching for data and running CPU-intensive software. But it truly shines for multimedia — from the built-in MP3 player to a movie player for watching MPEG, AVI or QuickTime MOV clips converted to Sony's MQV video format.

MOVING PICTURES

This provides surprisingly good playback: the standard quality setting of 2MB per minute lets you squeeze an hour's viewing onto a single 128MB Memory Stick. The TG50 also supports the new Memory Stick Select wafers (allowing the user to switch between two banks of up to 128MB for a maximum capacity of 256MB) plus the higher-capacity Memory Stick PRO (raising the storage roof to 1GB).

The CLIÉ's tinny speaker makes earphones a necessity; we liked the jack being sensibly mounted on the top deck (not on the side, as with previews models), but found it odd that Sony didn't throw in a set of headphones.



Fleet-footed: *the TG50's XScale CPU eats benchmarks for breakfast.*

Even when you're not watching movies, the TG50 is a guaranteed eye-catcher with its svelte form, brushed aluminium chassis and typically stylish Sony design. Plus it was cool the way the metal cover flips open, a là *Star Trek*, to reveal the display and keyboard.

Unfortunately, it's here that this silver sylph reveals a few rough edges. The brilliance of the hi-res, transreflective 320 x 320 panel is marred — like many CLIÉ cousins — by dappled patches at the foot of the screen, due to an uneven cast of the backlight.

And while the tiny keyboard looks oh-so-cool, the keys are too small and their movement too stiff for comfortably composing even short emails and SMS notes to be sent via the TG50's Bluetooth transmitter. We turned back to Graffiti (the TG50 runs OS 5, not 5.2, so you don't get the Jot-based Graffiti 2 engine) and had to put up with the pop-up input panel which occupies half the display.

The TG50 is exceptionally easy to use with one hand — the jog dial, action button, power-hold key and voice recorder controls are all located on the left side. Sandwiched between the keyboard and screen is a row of thin metal buttons to activate the standard Palm applets plus a rocker switch for up-down navigation, which we avoided using due an almost painfully sharp ridge in the middle of the key.

NO THANKS FOR THE MEMORY

On the software side, the TG50's best attributes include Sony's superb and jog dial-friendly application launcher, the aforementioned music and video players, plus file and Memory Stick management tools.

The bundled NetFront browser supports JavaScript, CSS and SSL, while CLIÉ Mail works with POP3 accounts and can offload file attachments onto a Memory Stick. However, instead of a suite like Documents to Go, which can edit Office files on the move, the TG50 opts for the second-rate solution of a file viewer.

Just don't get carried away loading too many of these supplied apps, as only 11MB of the 16MB of RAM is available, the rest being roped off by the OS for application heap space.

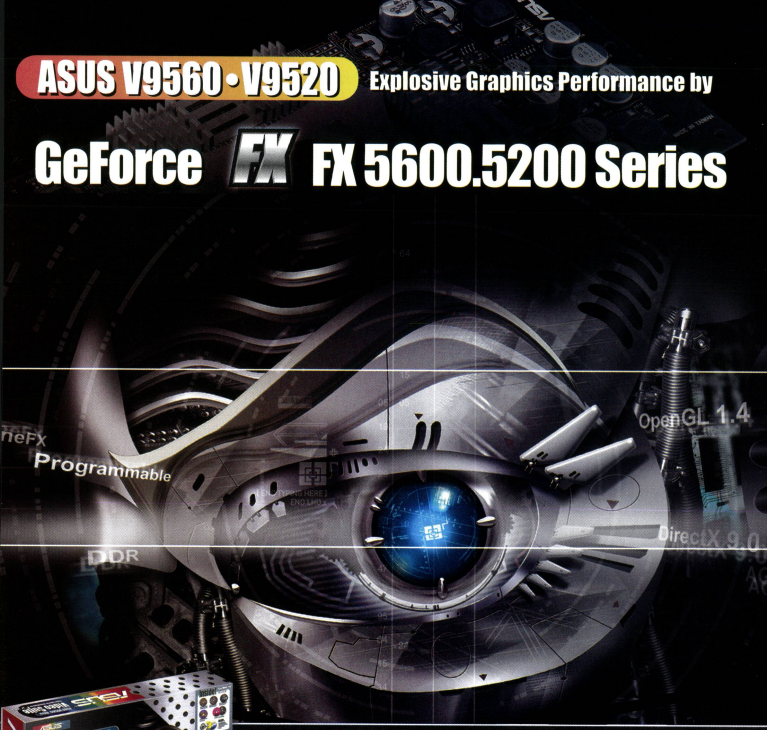
Sony claims the TG50's battery life as 11 days, based on an average 30 minutes use per day with the backlight off. Our own testing delivered almost 3.5 hours of looped video with the screen at full brightness, and a solid eight hours of MP3 playback. Disappointingly, the USB sync cable is hardwired into the desktop docking cradle, unlike previous CLIÉ models where the cable could be detached and used when travelling.

David Flynn

Details	
Contact	Sony Australia
Phone	1300 720 071
Online	www.sonystyle.com.au
Price	$849
✓	Fast CPU, great multimedia, built-in Bluetooth.
✗	11MB usable memory, uncomfortable keyboard.
Verdict	●●●●○

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  GeForce FX 5600 Ultra, Dual VGA, DVI. TV-out, 128MB DDR

V9520 Series

- **V9520 / Video Suite**
  GeForce FX 5200, Dual VGA, Dual DVI, TV-out, Video-in, SmartDoctor, 128MB DDR
- **V9520 / TD**
  GeForce FX 5200, Dual VGA, DVI, TV-out, SmartDoctor, 256/128 MB DDR
- **V9520 Magic / T**
  GeForce FX 5200, VGA, TV-out, 128/64 MB DDR

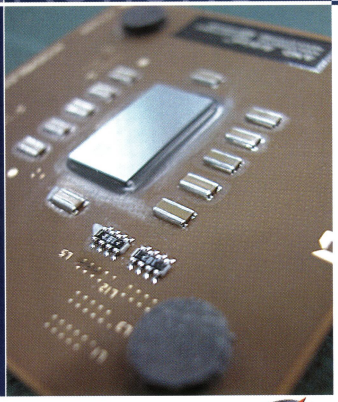
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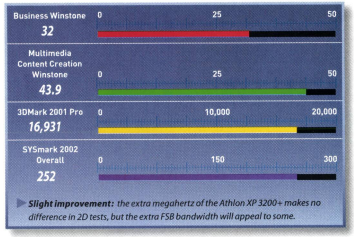
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Slight improvement: *the extra megahertz of the Athlon XP 3200+ makes no difference in 2D tests, but the extra FSB bandwidth will appeal to some.*

Megahertz so good



AMD's latest Barton-core CPU proves it's not just the megahertz that matter: it's how you use them.

The Athlon XP 3200+ is AMD's second desktop Barton-class CPU, and it arrived with little fanfare. Going back to the numerous tests in last month's *APC* (June, page 40) between the original Barton release, the Athlon XP 3000+, and Intel's 3GHz Pentium 4 Northwood B-class CPU, the P4 clearly emerged as the better performer.

Considering the specs of both CPUs, you could be forgiven for forming a conclusion before the rematch has even begun: the nominal 3000+ rating was, in fact, 2,166MHz and the 3200+ clocks 2,200MHz — against the P4's quad-pumped genuine 3,000MHz. But as we've discovered since the original Athlons stormed onto the scene, the stature of the CPU is not measured by megahertz alone.

BUS SPEEDS UP

For the 3200+, AMD has retained the 512KB onboard level 2 cache and this will not differ across any Barton-core models. The significant change is the boost in frontside bus speed (FSB) from 166MHz to 200MHz, and then increased again to 400MHz. Intel has FSB speeds covered by a massive margin. The Northwood B-class has an 800MHz FSB, up from 533MHz.

But like all revamps to basic system specifications, behind the specs lurks a chipset. Currently, AMD has support for the 400MHz FSB in an updated nVidia nForce2 chipset. For our testing, AMD supplied us with the ASUS A7N8X Deluxe, a premium Athlon motherboard using a Silicon Image SATA RAID controller and Corsair TWINX memory. Rumour has it that VIA's KT600 chipset will soon be ready and could give the nForce2 some stiff competition.

BENCHMARKS

The extra clock speed of the 3200+ made virtually no difference in the Business Winstone 2002 test, but there were gains in the similar SYSmark tests. The SYSmark Office Productivity score was 192, which eclipsed the Pentium 3GHz P4's 185, but the Internet Content Creation portion fared poorly with 332. This was an improvement over the Athlon XP 3000+, but nowhere near the P4's 392 SYSmarks.

On a pure processing scale the 3200+ managed 6,021 MIPS in arithmetic testing, a gain of 45 MIPS over the 3000+. However, it suffered a curious drop of 18 MIPS in floating point tests, the 3200+ managing only 2,979 while the 3000+ cranked out 2,997. The 3200+ still has a floating point advantage over the 3GHz P4, though.

Unfortunately, we encountered several problems while trying to install a copy of Windows XP Pro onto the testbench. At one stage it appeared almost impossible to benchmark the CPU using the motherboard supplied. We swapped AGP cards, ATA and serial hard disks, CD-ROM drives and memory.

We then tried to perform the installation with a slower Athlon XP CPU. We were so stumped we even hooked up a separate power supply. Eventually the BIOS settings had to be adjusted to allow the most benign configuration before it settled into a routine installation.

The phenomenon is not unique to this combination of components — we've observed the same behaviour with the Pentium 4 platform. The suspicion is that the more CPUs, memory and storage increase in speed, the less tolerant a system becomes.

The Athlon XP 3200+ is not a monumental advance in the Athlon range and the increase in FSB to 400MHz is an overdue improvement. On a real clock-by-clock basis, AMD still manages to extract more performance than Intel, but the advantage is negated by the chip's pricing.

At time of writing the 3200+ was US$464 (in 1,000-unit lots) while Intel was asking US$417 for the 3GHz P4.

David Lin

Details	
Contact	AMD
Phone	(02) 8877 7222
Online	www.amd.com
Price	US$464 (wholesale)
✔	Better floating point capability than the P4.
✖	Comparatively expensive.
Verdict	●●●○○

Power 4 the Next Generation



Advanced Intel Canterwood and Springdale Platforms from ASUS

800MHz FSB-fastest desktop CPU supported

Dual-channel DDR 400 for bandwidth up to 6.4GB/s

Hyper-Threading Technology ready

P4C800



P4C800
- Extreme performance for performance connoisseurs
- Supports the latest Intel Canterwood chipset
- Intel Proprietary PAT (Performance Acceleration Technology) to boost performance by 3-5%
- Combination of Serial ATA, AGP Pro/ 8X slot, Gigabit Lan Controller and Multi-RAID Function!
- ATX Form Factor

P4P800
- Perfect solution for advanced performance
- Supports the latest Intel Springdale-PE chipset
- ATX Form Factor

P4P800-VM
- Feature-rich solution for system builders
- Supports the latest Intel Springdale-G chipset with Intel Extreme Graphics 2
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Hyper-Threading Support

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USB2.0

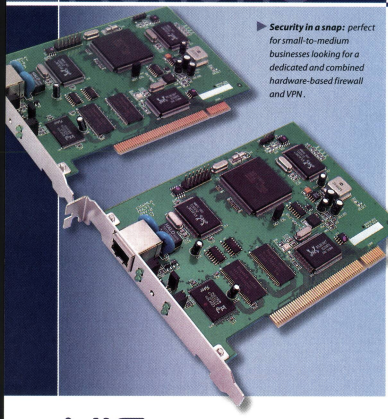
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Security in a snap: *perfect for small-to-medium businesses looking for a dedicated and combined hardware-based firewall and VPN.*

NICe and secure

This is a handy device for small businesses looking for a NIC-based firewall and VPN server solution.

Virtual Private Networks are nothing new; for years we've been hearing how they enable users to securely tether together networks. Traditionally the encryption associated with sending data securely down the VPN tunnel occupies plenty of CPU headroom, which has a significant affect on a VPN-equipped computer's productivity.

But the PCI630 by SnapGear takes a different approach by integrating VPN and firewall functions onto a network adaptor, thus moving the calculations away from the CPU. The device is aimed at companies implementing a secure, hardware-based firewall and/or VPN server, rather than them relying on OS features or third-party software to handle these security and connectivity aspects.

The card provides standard NIC functionality, using the Realtek RTL8129 chipset (which is also compatible with most available OSes). The core features of the card, however, are contained within its own Linux-based operating system, stored on 16MB of onboard RAM with a 4MB Flash RAM area, and powered by a 300MHz processor. The card draws all of its power from the PCI slot.

The OS (a custom Linux build by SnapGear called uClinux) is full-featured with both command line interactivity (via Telnet) and a Web-based management console (via the card's Net management default port 80).

The installation CD has a number of tools and user manuals, but the basic setup program interacts with the card's WAN and LAN interfaces (which are separate from the Realtek LAN interface) via the Web management config pages. It detects valid IP addresses or gives you the option to statically assign them. Once this process is complete, the Web management console (and Telnet port) is available for full configuration.

As expected from Linux, the default administrative user account is root, and further accounts may be set up. The quick setup wizard on the Web console's home page runs through basic setup features, for instance, addressing, bridging, DHCP and DNS services, NAT and DynamicDNS options.

The card can also accept ADSL connections, and can handle PPPoE traffic, thus making it an effective ADSL NAT router.

The firewall is a very secure and customisable ipchains build. The default configuration makes the card inaccessible from the outside network. All parts of the firewall can be configured using the Incoming and Outgoing traffic rules, and advanced options — port forwarding and static routing, for example — can also be changed.

Troubleshooting is easy. The ability to Telnet to the NIC allows low-level software and networking fault-finding and fixing. The card's Diagnostics features create a text capture of the entire OS (minus the passwords) to be emailed to an administrator or the manufacturers for advanced third-party troubleshooting.

THE ACID TEST

We experienced a few glitches during installation and initial configuration, mainly with connectivity to the card while modifying IP addresses to separate the LAN and WAN interfaces. Configuring the card off the network is the best approach, because all three interfaces are capable of dynamic IP configuration. However, this is not the best environment to test in, with a combination of static and dynamic IPs causing conflicts.

Configuring the NIC offline, we removed the bridging between the WAN and LAN interfaces — the LAN interface was assigned a static IP on the internal network, and the WAN interface a static IP on the external. We enabled NAT to provide communications between the two networks, and it worked perfectly as soon as the NIC was plugged into the external network.

Next, we created a PPTP VPN server by selecting to enable the server, assigning an IP pool for the NIC to assign VPN IP addresses from, and creating a VPN user. The NIC checks the credentials of VPN users against its own local database, or a RADIUS or TACACS+ database. The default authentication for the PPTP tunnel is MSCHAPv2.

VPN clients wishing to connect to this server don't need special client software. Setting up a standard VPN connection through the Microsoft networking wizard is sufficient to create a working connection.

This device is suitable for small-to-medium businesses looking for a dedicated and combined hardware-based firewall and VPN solution.

It could even be recommended for tech-savvy home users with an internal network and who are exploring alternative options from the range of external ADSL/firewall/VPN routers.

James Bannan

Details	
Contact	SnapGear
Phone	(07) 3435 2888
Online	www.snapgear.com.au
Price	$579
✔	Affordable; great configuration interface; good support.
✖	Too complex for beginners; vague setup instructions.
Verdict	●●●●○



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ASUS NOTEBOOK PC

Your Reliable Partner

Reliability is a must in this "survival of the fittest" world. The ASUS A2 notebook packs a full-spectrum of practical features and stable performance for different situations. Whether you are in a business conference, lounging at a cafe or tanning on the beach, the A2 is your trustworthy and value-rich companion.



Intel® Pentium® 4 Processor, up to 2.8GHz

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Built-in Wireless LAN (optional)

SiS M650 + SiS962 Chipset

14.1"/15.1" TFT LCD

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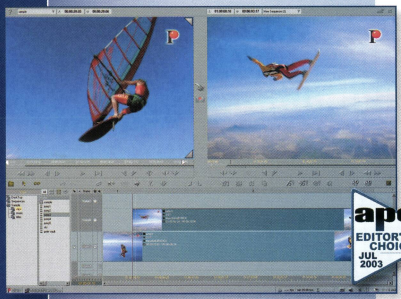
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HEART OF TECHNOLOGY



apc EDITOR'S CHOICE JUL 2003

Flying high: *Edition 5 is arguably the best non-linear video editing suite on the market.*

back to a Pinnacle-branded FireWire card, which is based on an Agere chip.

We took Edition 5 Standard through its paces on a 2.2GHz Pentium 4 with 256MB of DDR SDRAM and a 64MB GeForce 4 MX video adaptor. Despite throwing just about every effect we could at the video stream, it was impossible to bog it down.

During edits the system's CPU usage spent most of the time hovering around 65%, with only occasional 95% peaks, indicating that the kit had plenty of headroom in reserve.

A range of key-frameable effects and filters is provided — spanning from 2D and 3D transitions to chromakeying and blurring — and they can all be added and edited in real-time. We could layer six separate DV streams with effects on our 2.2GHz system without bumping the CPU usage meter up to 100%.

Users with older systems, less RAM and who don't have a dedicated capture card, will be limited in terms of the quantity of real-time effects that can be applied, and may also have to wait for scenes to render.

Pinnacle of excellence

With Edition 5, Pinnacle Systems raises the bar in the non-linear video editing market.

It wasn't long ago that almost every decent video-editing solution relied on a beefy co-processing card to handle real-time effects calculation and final rendering. This expensive spec set placed video editing in the hands of the truly dedicated or the techno-elite.

Fast forward to July 2003, and desktop PCs with barnstorming processors and meaty graphics cards have changed the rules. So too has Pinnacle's DV supersuite, Edition 5.

SHARING THE LOAD

Edition 5 doesn't need a co-processor card to move calculations away from the CPU. Instead, it shares the load between the main processor and the GPU, which provides impressive performance and real-time effects mixing.

It even pre-renders footage ahead of playback into a cache, which further helps smooth playback — saving CPU time for sections of footage that provide a massive arithmetic load. Hyper-Threading and multiple processors are also supported, enabling Edition 5 to scale-up according to the hardware available.

It's available in both Standard and Pro packages. The latter's bundle includes an AGP video card with analogue and digital inputs plus a breakout box. The more affordable Standard edition is intended for systems already bristling with video grunt, so the offering is trimmed

EDITING BY THE BOOK

Video editing packages are infamous for their steep learning curve. This is another area where Pinnacle sets out to smash the "status quo" — there's extensive documentation catering for users at a number of experience levels.

A quick-reference card contains keyboard shortcuts and the minimal amount of information that experienced video editors require to get straight to work. Several manuals are designed to assist intermediate users, while a thicker manual details every function and feature of the software.

The DVD mastering features are also of a very high quality. We found it easy to set chapter break points after editing and link to them from the main menu with video clips or still images. Clips can even be used to dizzying effect as the menu background.

The interface is also scalable to suit the needs and workflow of the operator, redefining shortcuts and moving buttons around onscreen to create a comfortable environment.

One benefit of the interface is that it's extremely similar to Pinnacle's high-end Liquid packages. This enables students to gain experience in non-linear production software without shelling out for more expensive hardware-based editing platforms.

This is undeniably the best ever version of Pinnacle's editing software. It also gives more established packages from Canopus and Avid a run for their money.

Solid documentation, a customisable interface, efficient editing and slick DVD mastering all add to Pinnacle Edition 5 being a top-drawer, non-linear video editing package.

Matt Overington

Details	
Contact	Pineapplehead
Phone	1800 657 601
Online	www.pineapplehead.com.au
Price	Standard, $1,550; Pro, $2,200
✔	Awesome NLE suite.
✖	Expensive.
Verdict	●●●●◐



MYPAL A620

The world's smallest and lightest Pocket PC with built-in CF support

What can PDAs do nowadays? ASUS' MyPal A620 Pocket PC supports a full range of peripherals and accessories, providing application expansion for Internet access, wireless communications, audio/video enjoyment and business-related functions.



MYPAL A620

Power CPU: Intel® latest CPU PXA255 400 MHz

New Software: Microsoft® Pocket PC 2003

Brilliant Display: 65,536-Color 3.5" Transflective LCD

Battery Life: Up to 19 hours while using ASUS SPS technology

Light Weight: 141g

Ultra Slim: 13.3mm

Fast Wireless: FIR/SIR

Expansion Slot: CF Type II Card Slot

The exclusive ASUS SmartKeeper technology automatically backs up existing system status when power level is low. You can now relax, because your important files are in good hands

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ASUS®
HEART OF TECHNOLOGY

Proxim ORiNOCO Gold ComboCard and AP-600 Access Point

Swiss army wireless

Proxim's latest PC card caters to all with complete 802.11 compatibility.



Details	
Contact	Infinity Communications
Phone	(02) 9923 1133
Online	www.proxim.com
Price	Gold ComboCard: $239; AP-600g: $659
✔	Compatible with all current wireless networks.
✖	Update required when 802.11g ratified.
Verdict	●●●●○

Proxim is certainly on a winner with the ORiNOCO Gold ComboCard as it provides the ultimate in wireless flexibility.

Targeted at both corporate and home networks, it's perfect for working with all three 802.11 standards. It's even compatible with Proxim's own 2X mode for 802.11a gear, which has a theoretical maximum speed of 108Mbit/s. The Gold ComboCard has the standard adequate security measures of 152-bit WEP in 802.11a and 128-bit WEP in 802.11b/g, enabling it to connect to secured networks.

As the .11g gear has been released before the ratification of the 802.11g standard, a driver or firmware update will be needed for these products to gain standards compliance.

The AP-600 Access Point isn't quite as versatile as the ComboCard. It's sold in three configurations — 600a, 600b and 600g. We tested the 600g version. Although aimed at the corporate market, it's still within the reach of home users and has all the corporate features we've come to expect from Proxim. These include MAC filtering, RADIUS access control, Web, Telnet and Serial (RS-232) connectivity to the management software and SNMP support.

Capable of being mounted on a desk, wall or even the ceiling, the AP-600 can be easily hidden away from view.

The performance of the Gold ComboCard and the AP-600 Access Point surpassed all other .11g gear *APC* has tested to date. With an average speed of 1.87MB/s and a peak speed of 2.15MB/s at a distance of five metres with a clear line of sight, Proxim has achieved an impressively stable implementation of the 802.11g standard.

Although other .11g gear tested reached similar peak speeds, none has achieved an average speed that comes close to the Proxim products.

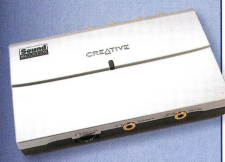
With so many wireless standards now available, consumers have plenty to choose from. Proxim's ComboCard removes the hassle of the purchase process with an offering that supports all three standards and provides maximum flexibility.

Paul Robinson

Creative Sound Blaster Digital Music

Sound-about

Creative's pocket-sized device adds audio oomph to notebooks.



Details	
Contact	Creative
Phone	(02) 9666 6100
Online	http://australia.creative.com
Price	$129
✔	More features than onboard sound, USB-powered.
✖	Bad-fitting laptop clip, sound quality inferior to internal cards.
Verdict	●●●○○

The Sound Blaster Digital Music device is Creative's latest effort to wring new markets and new money out of their core business. And it's a snap to use .

Step 1: whip out this compact unit (the size of a power supply brick, but much lighter).

Step 2: hook it up to the notebook's USB v1.1 port, no drivers required.

Step 3: pump up the volume. The unit takes priority over other sound devices installed on your system.

Of course, to use a device like this you'll also need to cart around a pair of quality external speakers, which detracts from the mobility factor.

A mounting clip allows for the box to be fitted to the back of the notebok's screen, but as the clip isn't adjustable, we found it useless on notebooks where the display panel wasn't exactly 13mm thick.

The presence of the box didn't hamper Wi-Fi signals from notebooks, with a built-in wireless aerial fitted inside the display panel. And as the box is a passive device, there were no issues with heat.

An abundance of interfaces, including microphone and volume-controlled headphone mini-jacks, line in and out RCA jacks, allow for a variety of analogue audio devices.

Dolby Digital 5.1 and EX certification leads to the presence of optical in and out SPDIF jacks, which can be plugged into any 5.1-channel stereo system for an enhanced DVD experience.

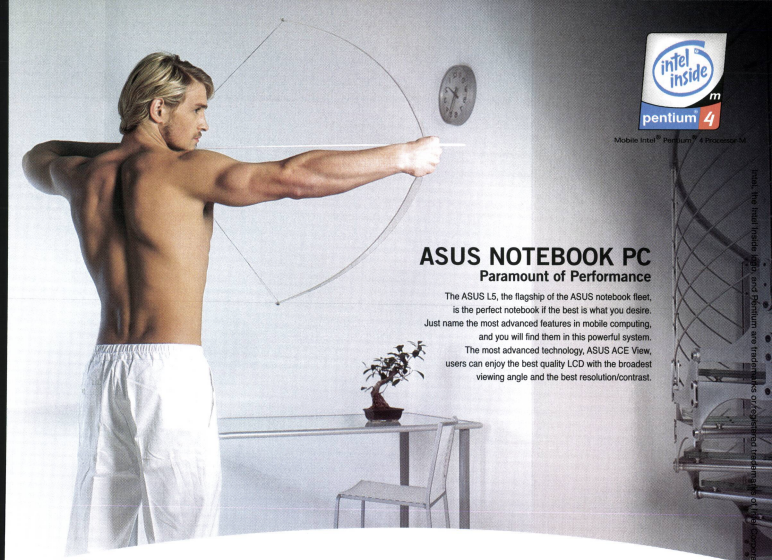
External AC-3 decoders are also supported — just toggle the output switch to Digital Only, and encoded audio is sent through the SPDIF interface.

Much like Creative's Sound Blaster Extigy, the quality of the Digital Music's 16-bit sound is better than what you'd get from an onboard processor, although it's not quite as good as from an internal sound card.

The software bundled with the Sound Blaster Digital Music includes a 10-channel graphic equaliser, bass booster (with the ability to set both gain level and crossover cut-off frequency), audio effects and 3D-sound.

And Creative's regular array of sound recording, mastering and editing software includes some great features. These eliminate most of the noise and clicking sounds that are usually present in analogue recordings.

Jarrod Spiga



ASUS NOTEBOOK PC

Paramount of Performance

The ASUS L5, the flagship of the ASUS notebook fleet, is the perfect notebook if the best is what you desire. Just name the most advanced features in mobile computing, and you will find them in this powerful system. The most advanced technology, ASUS ACE View, users can enjoy the best quality LCD with the broadest viewing angle and the best resolution/contrast.



Intel® Pentium® 4 Processor, up to 3.2+ GHz
Mobile Intel® Pentium® 4 Processor, up to 3.06 GHz

L5

ASUS ACE View

Built-in 3-in-1 Card Reader

15.0" TFT LCD

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ASUS®
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Canon Laser Shot LBP-2410

No cheap shot

Details	
Contact	Canon Australia
Phone	1800 021 167
Online	www.canon.com.au
Price	$1,899
✔	Low purchase price, reliable personal colour printing.
✖	Noisy.
Verdict	●●●●○



If you thought a desktop laser under $2,000 was impossible, think again.

Although the Canon Laser Shot LBP-2410 is a little expensive to run, there's no denying the appeal of having a sub-$2,000 colour laser printer on your desk — especially if you need quality colour output at reasonable volumes.

The Laser Shot measures in at 482 x 451 x 325mm (WDH), weighs 20.7kg with the ink cartridges fitted, and has a USB interface. Buyers also have the option of having a network card fitted for an additional $399. Canon rates the LBP-2410 as a 16ppm device in mono, which places it firmly within the workgroup printer class, but has chosen to present it as a personal solution with the ability to share if need be.

Printer settings within the driver aren't what you would expect. Most of the effects and enhancements — like the conversion of an image to an illustration or "vivid photo" (that Canon has previously included in its inkjet drivers) — are absent.

There's no draft or best setting; instead, the user chooses from general (default), photo, presentation or Web settings. The general setting rendered text well and its mixed text and graphics results were also very presentable.

Photos were passable, but nothing like a modest inkjet, and the presentation printing results were outstanding. Canon supplied some laser paper, but the results of text, graphics and photo output were hard to distinguish from those on plain paper.

Print times for plain text were good, taking just over one minute for a 12-page document. Our mixed text and graphics 12-page document slowed things down to three minutes and 16 seconds, although a lot of that time was spent rendering the job on the PC before sending it to the printer.

The LBP-2410 takes no time to warm up and is silent when idle, but it gives an almighty whine when it draws in and ejects paper.

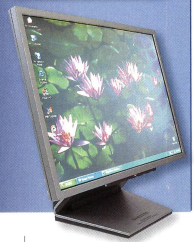
Consumables are on the pricey side, a black cartridge is $159 and colour $189. Canon estimates the cost of a colour page at 5% coverage is 23.32 cents, and 4.68 cents for a mono page.

David Lin

Samsung SyncMaster 152x

Pixel perfect

Details	
Contact	Samsung
Phone	(02) 9763 9700
Online	www.samsung.com.au
Price	$749
✔	Thin bezel, wall mountable.
✖	Hinge not always static.
Verdict	●●●●○



Save on desktop space and max out on style with Samsung's latest 15in LCD.

The 15in Samsung SyncMaster 152x's slim and attractive design, paired with its functionality, means it stands out from the LCD pack.

With a native 1,024 x 768 resolution, vertical refresh rates of 60, 70 and 75Hz and a refresh latency of only 16ms, DVD playback and games have a crisp, clear picture without motion blur. And the contrast ratio of 130:1 makes this panel suitable for use in almost any lighting conditions. On top of those impressive specs, our review model had no pixel flaws whatsoever.

The onscreen display is controlled by four buttons underneath the panel, and is extremely intuitive to use. The auto-adjustment function calibrates almost every aspect including image lock; horizontal and vertical position and size; focus; and more.

The screen's non-intrusive 1cm frame is perfect for those who'd like to use multiple displays — by sitting two of these LCDs next to each other, your mouse will have to jump only a few centimetres, instead of a few inches, from screen to screen.

Purchasing two 152x LCDs could be cheaper than one 20in CRT, and give you more screen real estate.

A sturdy base links the screen via two hinges, which give users great flexibility in where the screen can be positioned. You can open up the first hinge to position the screen at eye-level, or close it to bring the LCD closer to the desktop. Because of this, the monitor can be oriented at any angle up to 120 degrees towards the user from horizontal.

A metal mounting bracket is included, enabling the 152x to be securely fixed to a desk, wall, roof or any flat surface. When folded to its most compact form, the front of the screen sits only 5cm away from the surface it is mounted on.

In order to have the LCD that close to the mounting surface, the VGA and power plugs have been appropriately positioned behind the first hinge. Unfortunately, this model doesn't include a DVI interface, and is costly.

And good news for those who like a tidy desktop: an external transformer supplies the power to the monitor and its two-metre cable allows it to easily be hidden behind a desk.

Jarrod Spiga



ASUS NOTEBOOK PC

Slim in Size ; Rich in Features

The ASUS M2N incorporates latest mobile computing technology- Intel® Centrino™ Mobile Technology. Its modular design allows flexibility for swapping internal CD, DVD, Combo, CD-RW floppy or a 2nd hard drive. Use high-speed external peripherals such as hard drives, scanners, or digital camcorders at SCSI speeds with built-in IEEE 1394 and USB2.0 support. Of course standard features such as integrated LAN, modem and PCMCIA support are also available.



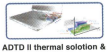
Intel® Centrino™ Mobile Technology



PortBar III and swappable multi-module



Optional 4- in-1 Card Reader (SM/SD/MS/MMC)



ADTD II thermal solotion & Power4 Gear to extend battery life



Intel® Pentium® M Processor 1.60 GHz

Intel® PRO/Wireless 2100 Network Connection 802.11b

Intel® 855 Chipset Family

M2N

14.1" TFT LCD

Min 22mm thin, 2.2kg weight

Support Swappable bay and PortBar III

7.4Hr battery life

(The above battery figures are measured with Mobile Mark 2002 after activating Power4 Gear battery-saving technology.)

Wireless connectivity and some features may require you to purchase additional services or external hardware. Availability of public wireless LAN access points limited. System performance measured by MobileMark* 2002. System performance, attery life, wireless performance and functionality will vary depending on your specific hardware and software configurations. See *http://www.intel.com/products/centrino/more_info for more information*

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Small size, big sound

The new super-slim iPod is elegance and simplicity at its best.

Apple's first-generation iPod took the world by storm. Digital music lovers praised its unique styling, large hard disk, smooth skip protection and user-friendly menu system. This second release is better in every way, with a new face, slimmer body and more memory.

apc EDITOR'S CHOICE JUL 2003

The clean lines of Apple's stylists partner with the white acrylic face to lend the iPod a smooth, almost androgynous look that portrays the very latest in geek chic. Weighing 212g, the overall effect is of a heavy deck of cards.

A 2in LCD panel, backlit with a blue LED, occupies most of the front face. Running at a native resolution of 160 x 128 pixels, the sharp display is ample for six lines of text. The user interface is easy to use, allowing quick navigation around the now-customisable menus.

The circular touch pad controls menu selection, thus improving the scroll buttons found on the previous model. The dial and buttons are extremely sensitive, so it takes a little time to adjust. A hold switch prevents accidental pocket-jostled activation.

The iPod looks more than sturdy enough to cope with rough conditions, and the 32MB solid-state memory cache (twice as much as any other MP3 player on the market) provides up to 20 minutes of skip-free playback when the hard drive is jostled.

Connection to Windows and Mac computers is via the fast and trusty FireWire cable. The iPod also supports USB 2.0, although the dock-to-PC cable is sold seperately.

Bundled software includes Musicmatch Jukebox for the PC and iTunes 4.0 for the Mac. The sound is crisp and very loud.

While Apple claims around eight hours life from the rechargeable lithium battery, we found only six could be expected under heavy use. However, the iPod can now be charged over a FireWire cable, making it easy to juice up wherever there's a handy computer.

Although the price will make some flinch, the new iPod follows the original in standing clear above the competition.

James Eke

Details	
Contact	Apple Australia
Phone	13 36 22
Online	www.apple.com.au
Price	10GB: $595, 15GB: $799, 30GB $999
✓	Crisp, clear sound.
✗	Expensive.
Verdict	●●●●○

Two in one

With both + and - DVD burning supported, this drive streaks ahead of the pack.

Sony's 510A internal DVD+/- RW drive is a vast improvement on the previous DRU500A model in both performance and price. The 510A retails for $699 — a full $200 cheaper — but that doesn't equate to a drop in speed. In fact, the DRU510A offers significant advances.

apc EDITOR'S CHOICE JUL 2003

DVD+R and +RW recording have been increased from 2.4 to 4x while CD RW burn rates are boosted from 12 to 16x, and DVD playback from 8 to 12x.

Sony's strong presence in the optical media industry enables it to provide complete media compatibility, supporting plus and minus media for both burning and reading. Other drives can read both types of media, but can write only to one or the other, making the 510A an obvious choice for anyone wanting flexibility.

The +R and +RW performance could be tested only at a maximum speed of 2.4x as the test media wasn't rated to 4x. However, results were encouraging. Comparing the results to last month's DVD writer Labs Challenge (*APC* June, page 72), the Sony came out on top with a +RW burn time of 22 minutes and 20 seconds — 45 seconds faster than the Plextor PX-504A (which won June's Labs Challenge).

Also, DVR-R performance was extremely fast, with a burn time of 14 minutes and 32 seconds — only seven seconds behind than the fastest drive in the Challenge, the LaCie DVR-105.

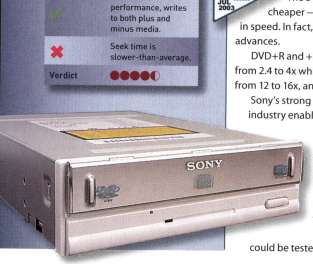
One disappointing aspect was the very ordinary seek time. Clocking 150ms for a random seek, the 510A was considerably slower than the majority of other DVD burners on the market.

An external version of the drive, named the DRX510UL, retails for $999 and sports both FireWire and USB 2.0 interfaces.

Those contemplating buying a DVD burner should consider this model. The 510A's excellent performance and flexibility with media formats would have seen it take out the Editor's Choice had it been available for June's DVD writer Labs Challenge.

Paul Robinson

Details	
Contact	Sony Australia
Phone	1300 137 669
Online	www.sony.com.au
Price	$699
✓	Excellent performance, writes to both plus and minus media.
✗	Seek time is slower-than-average.
Verdict	●●●●◐





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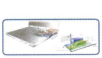
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ARC Computers 02 9894 9655
AVO Computacare 02 9959 3338
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Ecom Computers 1300 369 838
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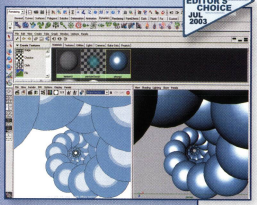
Big-budget blockbuster

Details	
Contact	Alias|Wavefront
Phone	(02) 9966 4581
Online	www.stormfx.com.au
Price	$4,565
✔	Best 3D modelling and rendering software available.
✖	Expensive for most users.
Verdict	●●●●◐

From the desktop to Hollywood blockbuster, all you need is Maya, time and deep pockets.

Maya is one of the few software applications to have successfully graced the big screen. The professional 3D animation and effects package played a starring role in *The Lord of the Rings* and was used to design the 3D worlds in games like Gran Tourismo 3, the Tekken series and FIFA 2001. Maya's rise to fame peaked in March when its Canadian developer, Alias|Wavefront, picked up an Oscar for scientific and technical achievement.

apc EDITOR'S CHOICE JUL 2003



This is a massive program with a steep learning curve, but once you get a handle on the interface, it won't be long before you're creating stunning images.

The most significant changes between versions 4.5 and 5 are to the rendering engine. There are four options, including the original software renderer, Mental Ray, and new vector and hardware renderers.

One of the coolest additions to Maya 5 is the renderer that converts 3D content into 2D content, which can then be inserted into animations or loaded into a vector-drawing program like Illustrator. Use this to generate stunning Flash or AutoCAD DWG creations. The Cg language is supported, so it's easy for developers to create new plug-ins.

If money is no problem for you, then Maya's $13,000 Unlimited version features Maya Fluid Effects, which simulate liquid, fire and ocean effects; Maya Cloth for modelling fabric; Maya Fur, used for styling short hair and fur; and Live MatchMoving to provide seamless matching of live footage with rendered elements.

At the other end of the scale, a free version of Maya 4.5, the Personal Learning Edition, is available for download from **www.aliaswavefront.com** for non-commercial use. This enables students to become experienced in using 3D modelling software without the horrendous costs. Educational packages are also available for schools teaching 3D design.

Maya really does stand head and shoulders above the competition in a world of its own creation.

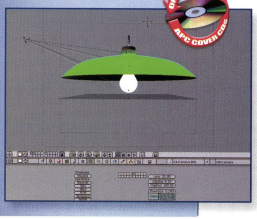
Matt Overington

A cheaper blend

Details	
Contact	Stichting Blender Foundation
Online	www.blender.org
Price	Free
✔	Capable of producing awesome results.
✖	Slow on a low-power graphics card.
Verdict	●●●●◐○

Blender proves that you don't need to sell your soul to create professional animations.

Professional-level post-production and scene rendering is big business. These burgeoning industries have received much attention in recent years through the popularity of such films as *Shrek* and *The Matrix*. Traditionally, the packages required to generate these scenes are outrageously expensive, which makes it difficult to get experience in 3D applications.



Blender began life as a commercial program, but the Blender foundation moved to open source development in July 2002. It can be used to create rendered graphics and animations and competes on a par with commercial applications like Caligari trueSpace.

The real-time engine found in Blender up until 2.25 has been temporarily dropped pending legal advice, but 2.25 is still available for download from the Blender site.

The editing interface is confusing, and one of the biggest points working against the uptake of 3D design packages is a steep learning curve. That said, the entire Blender 2 manual is available as a PDF download for US$12. There's a vibrant online community of users who regularly post their models, so it's easy to incorporate other people's work into your own.

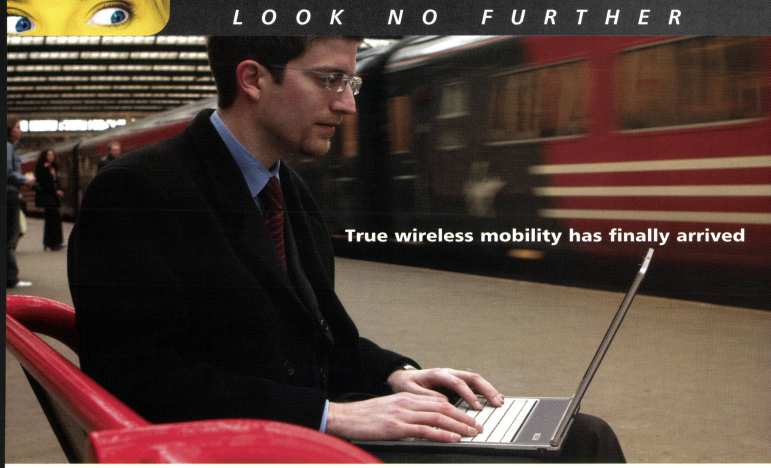
It's hard to fault a free program but there are a few areas where Blender falls down. Its greatest strength is ease of editing wire frame models and adding step points, but it requires a beefy and dedicated graphics card to operate smoothly. The worst exclusion is advanced shading, which was slated to be included in the 2.27 release but has been held over pending further tweaking.

Although it can't match the features of Maya, Blender is remarkably full-featured for a free product and capable of producing stunning results. Community plans for the project are enough to bring it up to the same functionality as commercial applications.

Plans are underway to add audio-editing features into 2.28, and the community is calling for Python and C programmers to join the development team.

Matt Overington

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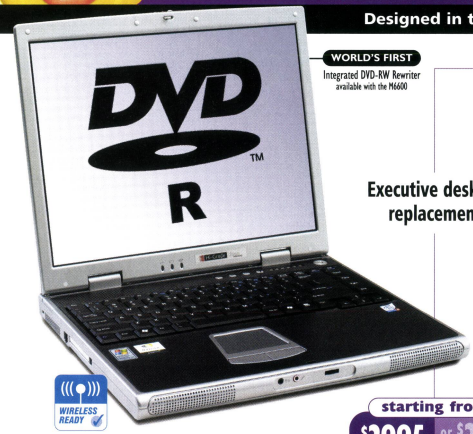
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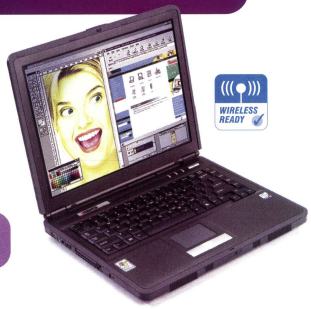
NOTINO 4400

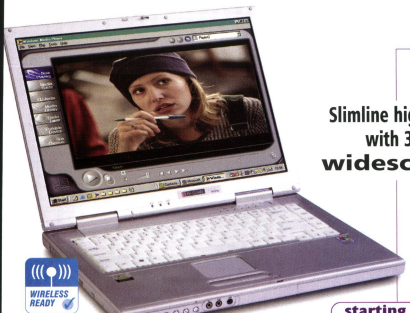
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Nvidia GeForce4 440 Go with 64MB DDR VRAM

DVD/CD-ReWriter combo drive or CD/DVD-R Combo drive

Li-ion battery 9 cell (~2.30 hours)

Type II PC-card slot

Ports: external VGA, 2 x USB 2.0, parallel, serial, IEEE1394, TV-out, IR, line-out (with SPDIF), mic-in, line-in,

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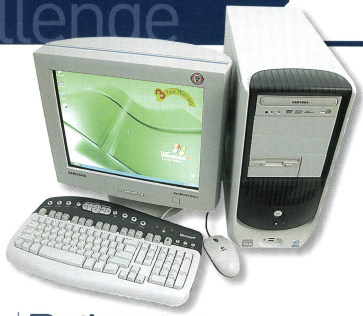
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Two-grand tigers

A few thousand dollars can buy a lot of PC.

***Jarrod Spiga* squeezes the pennies and compares**

16 sub-$2,000 systems.

A few years ago, a half-way decent PC cost at least $3,000. Today, you can walk into a store with two grand, and be amazed at what you can walk out with. We certainly were, after we put out the call for vendors to supply *APC* with their best system for under $2,000.

The result was an incredible mix of machines and different configurations: 19in LCD and CRT screens, bundled printers and scanners, compact cases, latest CPUs and motherboards, and extended warranties. $2,000 seems the sweet spot if you want a second PC for the home, a few for the office or a no-risk recommendation for friends.

Some vendors reduced the specifications of certain components in order to bump up others. Some took a more balanced approach to building their systems, while a few missed the mark entirely: notably Acer, whose T300 had apalling 3D performance, and BlueChip Infotech, the only OEM to opt for a wimpy Celeron processor in a pack of P4s and Athlons.

16 vendors supplied systems for testing. Our initial guest list included Adelong, Apple (for the eMac), Compucon, Dell, HP, NEC and Pioneer, but these companies were either unable to, or chose not to, participate.

How we tested

All PCs submitted for review were rigorously tested with a variety of synthetic and real-world benchmarking applications. Business Winstone 2002, Multimedia Content Creation Winstone 2003, SYSMark2002, WinBench 99, PCMark2002, Sandra 2001, 3DMark2001 Pro, Quake III Arena, Unreal Tournament 2003, Vulpine GLmark, SPECviewperf and PIFast were used (see the May issue of *APC* for a full examination of our benchmarking methodology).

Because of the variety of systems received from the vendors, the judgements in this roundup go beyond benchmarking. The entire contents of the system was considered in our overall rating.

Price was the only common factor, so computers that offered standout features for the end user were given a more generous weighting.

Daitronics

apc EDITOR'S CHOICE JUL 2003

Daitronics has squeezed just about everything you could want into this bundle, including a Canon i320 BubbleJet Printer and Canon LiDE 20 USB scanner. The scanner is handy for content creation, so it's just as well that this PC returned such good results in our content creation benchmarks, ending up in the top 20th percentile of all computers tested. The system also scored well in office productivity tests, making it a solid machine for business purposes.

The package is also no slouch with gaming. Scoring 6,712 3DMarks is not as high as some of the competitors in this roundup, but it's still good enough to ensure a decent performance in almost any game. Using a resolution of 1,024 x 768 at Truecolor, we were able to reliably get in excess of 150 frames-per-second (fps) when playing Quake III Arena, and more than 40fps when playing Unreal Tournament 2003 — adequate for all but the most hard-core gamer.

For handling data storage, the Western Digital WD800JB 80GB hard disk drive is one of the best value drives on the market. The Samsung optical drive reads DVDs, and can read from, and write to, CDs — although having only one optical drive means slow copying of CD media. The Samsung 17in monitor is as flat as they come, and the two-year return-to-base warranty will be a comfort.

The only negative is the small amount of RAM shipped with the unit. All other boxes in this roundup have a minimum of 512MB DDR RAM, yet the Daitronics PC comes with only 256MB.

For all intents and purposes, this will still do the job, but you wouldn't want to have lots of applications running simultaneously or things could start to slow down. At least upgrading system memory is a relatively quick and simple task.

Details	
Contact	Daitronics
Phone	(03) 5823 1249
Online	www.daitronics.com.au
Price	$1,999
Business Winstone 2002	10 — 28.9 — 40
SYSMark2002	100 — 234 — 350
3DMark2001 Pro	1K — 6,712 — 10K
Unreal Tournament dm-antalus	20 — 53.4 — 80
✔	Good performance, bundled scanner and printer.
✖	Only 256MB RAM.
Verdict	●●●●○



Acer

As it's missing the components required for gaming, the Acer T300 has seemingly been designed for the workstation market. The 2D graphics performance is quite good, but unfortunately there's no 3D acceleration. We were unable to play Unreal Tournament 2003 at a resolution of 1,024 x 768, and even running in a software-emulated 640 x 480 mode with a 16-bit colour palette, we could still average only 25fps. As a result, we were unable to complete most of the gaming benchmarks with this package.

However, the T300 doesn't score too badly when running productivity applications, especially in the area of I/O transfers. The Seagate 40GB hard disk drive gave us the best scores in our hard disk data transfer tests under WinBench and Sandra (both reporting rates of approximately 31MB/s). The other results that we obtained during productivity tests were around, or slightly higher, than the mean in this comparison.

The Philips optical drive has both DVD and CD-RW functionality, but some users may want more video landscape than the 15in CRT screen provides. Acer supplies a one-year onsite warranty with the system, but that's not enough to lift this machine out of the doldrums.

Details	
Contact	Acer
Phone	1300 366 567
Online	www.acer.com.au
Price	$1,999
Business Winstone 2002	10 — 24.1 — 40
SYSmark2002	100 — 208 — 250
3DMark2001 Pro	1K — Incomplete — 14K
Unreal Tournament 2003 dm-antalus	20 — 32.0 — 80
✔	Good hard disk.
✖	Appalling 3D performance.
Verdict	●◐○○○

ACO

Australia Computer Online shipped us a system that, on paper, comes close to matching the average specification for all computers supplied to us for this roundup.

Containing a Pentium 4 processor running at 2.4GHz, 512MB of DDR memory, Leadtek Winfast GeForce4 MX 440 graphics card, 10/100 Ethernet, 60GB Seagate Hard disk drive, Microsoft multimedia keyboard and mouse, and DVD and CD-RW, we didn't expect much to jump out at us. And it didn't.

With respectable scores of 41.5 in Winstone's Multimedia Content Creation 2003, and 321 in SYSmark2002's Internet Content Creation tests, the bundle performed slightly better in content creation tests than anticipated. Combined with office productivity test results right on the mean, this system should perform well in the office.

The box performed adequately in gaming applications. There was a lower frame rate when testing at higher resolutions in Quake III Arena, due to the lower fill-rate supported in this GPU. But we were still able to consistently remain above the minimum 24fps required for smooth animation when running at 1,024 x 768 — the native resolution of the 15in BenQ LCD panel.

The case has an array of coloured lights and switches on the front, but this does little to distinguish an otherwise grey machine.

Details	
Contact	Australia Computer Online
Phone	(02) 9747 0001
Online	www.computeronline.com.au
Price	$1,994
Business Winstone 2002	10 — 27.9 — 40
SYSmark2002	100 — 236 — 250
3DMark2001 Pro	1K — 4,396 — 14K
Unreal Tournament 2003 dm-antalus	20 — 51.1 — 80
✔	LCD screen.
✖	Nothing outstanding.
Verdict	●●●●○

Altech

Housing a Soltek SL-85DR3-C motherboard and a Granite Bay chipset, the aptly-named Black Storm is the only PC in this roundup that operates at the 800MHz frontside bus speed. Because of this, the synthetic benchmarking results show this power tower clearly has an advantage over its rivals with CPU processing power and memory bandwidth. But does this translate to a significant performance gain?

In the Internet Content Creation tests included in the SYSmark2002 benchmark, this computer left everything else in its wake. Unfortunately, the same can't be said for the results from other benchmarks, especially office productivity applications.

3D graphics performance was above average thanks to the Geforce4 Ti 4200-based VGA card. The Samsung 17in monitor (also in black) displayed Quake III comfortably at over 150fps.

A wireless keyboard and mouse are also included in the package and the wireless transceiver does recharge batteries. The keys are a mixture of triangular and trapezoidal shapes. As a result, the keyboard can be difficult to use.

Altech's box is certainly eye-catching, and even though it doesn't offer the performance that you may expect from an 800MHz FSB machine, it's still great value for money.

Details	
Contact	Altech
Phone	(02) 9735 5655
Online	www.altech.com.au
Price	$1,999
Business Winstone 2002	10 — 20.2 — 40
SYSmark 2002	100 — 204 — 250
3DMark2001 Pro	1K — 8,492 — 14K
Unreal Tournament 2003 dm-antalus	20 — 33.1 — 80
✔	Granite Bay chipset running at 800MHz FSB.
✖	Small hard disk, unusual keyboard.
Verdict	●●●●○



Cam1

The Cam1 system looks bland from the outside, but don't judge this one by its cover — it's a solid performer.

The Gigabyte GA-8ST800 motherboard has a number of onboard features including 10/100 Ethernet and Realtek AC'97 audio processor. A Netcomm V.92 modem is inserted in one of the five PCI slots.

Crunching the numbers is an Intel Pentium 4 2.4GHz processor, assisted by 512MB of 333MHz DDR RAM. The combination produces above average productivity scores, almost taking out top honours in Winstone Multimedia Content Creation (41.7).

The 80GB Western Digital drive consistently scored better results in the PCMark2002 hard disk drive benchmark — coming in third with 1,147 marks. Unfortunately, DVD playback isn't possible, though the writing of CDs can be done quickly with the Lite-On CD-RW drive (operating at up to 48x).

The graphics sub-system is made up of a Leadtek WinFast A170 GeForce4 MX440 AGP card, connected to a Syscan 15in LCD panel. In our tests, there was a degradation of just under 50% in frame rate as we increased resolution. The response time of 30ms may be a little slow for viewing fast-moving graphics, but the image quality of the display is quite good.

CWS

This offering from Computer Warehouse Sydney came close to winning our Editor's Choice, largely because of its blistering 3D graphics performance. The excellent 3D can be attributed to the ATI Radeon 9700 Pro GPU sitting on the video card, serving up figures of 13,077 3DMarks (the highest score in this comparison) and giving peak frame rates of 210fps in Unreal Tournament 2003.

The package turned in some good results in day-to-day applications, especially with office applications. Real-world productivity tests show that this system goes as well as most other units tested here — the AMD Athlon CPU responsible for the good results. The ASUS CD rewriter readily archives data stored on the 80GB Western Digital hard disk, or copies CD media used in the Samsung DVD drive. The ASUS H600A case is of the plain vanilla variety used by many OEM builders, but the NEC 17in screen is good value for money and as flat as they come.

The only negative was that it was unstable at times, and while running 3D benchmarks would occasionally freeze or reboot for no apparent reason. We were able to minimise instabilities by using video drivers that were different to those supplied with the card, but we were unable to completely eliminate them.

Digital Star

Digital Star's IntelliPro 2400GX comes with a stylish LCD panel — the BenQ FP567S 15in — which displays a sharp 1,024 x 768 image. Some LCD panels have had latency problems with media clips and 3D action games, but with a latency of only 16ms, this panel handled everything we threw at it.

Digital Star's offering ships with a Leadtek WinFast A180 GeForce4 MX 440 AGP card. As a result, this computer will allow you to play the latest 3D games, but you shouldn't expect to be dazzled by its 3D performance. We were able to remain above the minimum 24fps required to keep smooth motion throughout all 3D tests, but in the most intensive Unreal Tournament 2003 tests, there wasn't much margin for the frame rate to drop any further.

Though this package is only average in terms of gaming performance, it shines when put to more productive uses. We obtained the best benchmarking results across the board for Winstone Multimedia Content Creation 2003 (44.5) and SYSmark2002, and very high results from PCMark2002. These results can be attributed to the 2.67GHz Intel Pentium 4 CPU running under the hood.

Another plus is that the system ships with a two-year return-to-base warranty, giving the user some additional assurance that their investment will last.

Details	
Contact	Cam1
Phone	(02) 9999 5600
Online	www.cam1.com.au
Price	$1,899
Business Winstone 2002	10 — 26.8 — 40
SYSmark2002	100 — 237 — 250
3DMark2001 Pro	1K — 4,371 — 14K
Unreal Tournament 2003 dm-antalus	20 — 49.5 — 80
✔	LCD and is Internet ready.
✖	Bland appearance, no DVD.
Verdict	●●●○○

Details	
Contact	Computer Warehouse Sydney
Phone	(02) 9559 2998
Online	www.cwsydney.com.au
Price	$1,999
Business Winstone 2002	10 — 31.2 — 40
SYSmark 2002	100 — 219 — 250
3DMark2001 Pro	1K — 13,077 — 14K
Unreal Tournament 2003 dm-antalus	20 — 64.9 — 80
✔	Great 3D performance.
✖	Some instability issues.
Verdict	●●●●○

Details	
Contact	Digital Star
Phone	(02) 8748 6888
Online	www.digitalstar.com.au
Price	$1,999
Business Winstone 2002	10 — 29.4 — 40
SYSMark2002	100 — 246 — 250
3DMark2001 Pro	1K — 4,766 — 14K
Unreal Tournament 2003 dm-antalus	20 — 53.0 — 80
✔	Fast processor.
✖	Average 3D performance.
Verdict	●●●◐○

invent

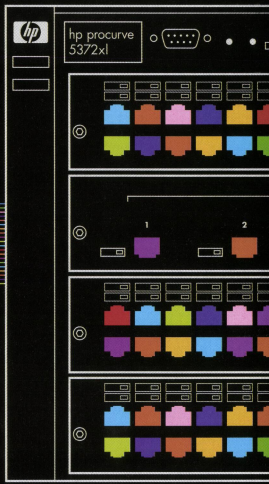
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Bluechip Infotech

This offering from Bluechip Infotech is the only machine in our roundup powered by an Intel Celeron processor. It's an attractive, albeit under-powered, unit. The fact that the CPU hurtles along at 2.4GHz is enough to keep it up there in synthetic CPU benchmarks — but its 400MHz system bus speed creates a bottleneck that slows down real-world applications. Both Sandra and PCMark2002 verify this, giving memory benchmark scores just over half of the mean score.

A black 15in AOpen LCD screen is fed information from the onboard VGA port, powered by the Intel 845G-based chipset on the motherboard. Given the GPU isn't made by the big 3D chipset manufacturers, the gaming performance of the system is not as good as the competition; it scored a low 1,049 3DMarks, and struggled to average over 24fps while playing Unreal Tournament at 1024 x 768.

On a more positive note, the unit does have both a 16x DVD drive and a Lite-On 52x24x52 CD-RW drive, supporting on-the-fly CD duplication. Inside the case, a 40GB Western Digital hard disk drive will store your valuable data, while an internal 56K modem opens the door for dialup Net access.

Details	
Contact	Bluechip Infotech
Phone	(02) 8745 8400
Online	www.bluechipit.com.au
Price	$1,999
Business Winstone 2002	10 **17.3** 40
SYSmark2002	100 **136** 250
3DMark2001 Pro	1K **1,049** 14K
Unreal Tournament 2003 dm-antalus	20 **25.3** 80
✔	Attractive design.
✖	Poor 3D performance.
Verdict	●●◐○○

EPC

For gamers on a budget, the EPC Dream Machine is exactly what its name indicates. Exclusive Personal Computers (EPC) integrated higher-spec components in the box, but left out some others in order to stay within the $2,000 budget.

The flash-looking case comes complete with additional cooling fans lit with multi-coloured LEDs. There is a carry handle on top — handy for gamers hauling their PC to the occasional LAN event.

Inside you'll find a beefy AMD Athlon processor utilising the Barton core, a whopping gigabyte of RAM, and an nVidia GeForce4 Ti 4200 graphics card. All of this power provides impressive benchmarking results, especially with gaming.

With this unit we consistently had the highest frame rates in our tests. An average of 240fps when playing Quake III Arena at 1,024 x 768 at Truecolor is very impressive for a sub-$2,000 computer. The Dream Machine also performed well in productivity, achieving the highest Business Winstone 2002 result.

However, some corners have been cut to make these specs. The system lacks a floppy drive, and has only one optical drive, which means CD duplication will be time consuming. But the 80GB hard disk drive has more than enough space to create CD images for burning.

Details	
Contact	Exclusive Personal Computers
Phone	1300 656 265
Online	www.e-pc.com.au
Price	$1,999
Business Winstone 2002	10 **37.4** 40
SYSmark2002	100 **Incomplete** 250
3DMark2001 Pro	1K **12,141** 14K
Unreal Tournament 2003 dm-antalus	20 **75.4** 80
✔	Brilliant gaming performance.
✖	No floppy or DVD.
Verdict	●●●●◐

Forte

The Fortress package has been put together with productivity in mind and is excellent value. For under $2,000 you get a decent PC, a Canon S200SP Bubble Jet printer and a Genius Super 600 USB scanner.

The computer itself is firmly positioned in the middle of our roundup, with results of 308 and 158 for SYSmark2002's content creation and productivity tests. Considering that concessions have to be made to fit the bundled components in, this is not a bad result, especially when the system comes with a 15in Viewmaster LCD panel.

Throwing pixels at the flat screen is an Eagle GeForce4 MX 440 graphics card. Again, the benchmarks performed rated this system in the middle of the pack, with 5,341 3DMarks. We were able to keep average frame rates in Unreal Tournament 2003 of above 42fps (at the screen's native resolution of 1,024 x 768, at 32-bit colour).

At the heart of the case is a Pentium 4 CPU running at 2.4GHz with 512MB of 333MHz DDR RAM. Corners were cut to keep this bundle under budget with the Seagate 40GB Barracuda hard disk.

But you also get two LG optical drives — one DVD, the other CD-RW — so CD duplication can be performed on-the-fly. Lastly, the inclusion of an internal 56K modem makes this a great value system.

Details	
Contact	Forte
Phone	1300 368 922
Online	www.fortecomputers.com.au
Price	$1,990
Business Winstone 2002	10 **26.9** 40
SYSmark2002	100 **221** 250
3DMark2001 Pro	1K **5,341** 14K
Unreal Tournament 2003 dm-antalus	20 **55.1** 80
✔	Bundled printer and scanner.
✖	Small hard disk.
Verdict	●●●●○

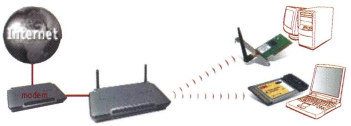
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- Features 64- and 128-bit WEP encryption
- Works with Windows® 98 SE, 2000, Me, or XP



54g Wireless Notebook Network Card-F5D7010au

- Connects your notebook to a wireless network
- Works with all 802.11b devices
- Features 64- and 128-bit WEP encryption
- Works with Windows 98 SE, 2000, Me, or XP



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What warrants a warranty?

A safety net of a parts and labour warranty for their investment is one of the main reasons why users purchase complete systems from OEMs.

All warranties can be broken down into two types — parts and labour. The hardware manufacturer usually provides a parts warranty; they're the party that'll fix or replace the component if it is faulty. The vendor will provide the labour warranty, which covers any damage done to components during, or as a result of, its assembly.

In some cases, the labour warranty will also give you immediate replacement of a faulty component, instead of forcing you to wait for the manufacturer to send a repaired or replacement product.

Tinkering inside your new box can void your labour warranty. Some PCs will arrive with small "warranty void if removed" labels covering specific areas on the case. Tearing or peeling one of these labels indicates to a technician that someone has opened your case and possibly damaged something, which is not covered by the scope of the warranty.

If you want to upgrade your system, there are a couple of ways to go about it without risking your labour warranty. Purchasing the upgrade through your system supplier will often include free installation. If you buy the upgrade hardware elsewhere, getting your PC builder to perform the installation will also preserve your warranty.

With return-to-base warranties, you will need to send or take the PC back to the vendor for support. If you have to send it back via courier, you're unlikely to be re-imbursed for shipping charges — just be sure to package the PC safely and securely. An on-site warranty will make the vendor come to you for any repair or replacement.

Look out for those terms and conditions — usually printed on an insert. Most importantly, if you have any questions regarding your warranty, consult your vendor.



Hallmark

The iStealth is an attractive, compact unit that's a real pleasure to use. The gunmetal micro-ATX case can be placed in either a vertical or horizontal configuration. But while the case is only slightly wider than a PCI card, the door covering the optical drive can get a little annoying if you're frequently inserting and removing CDs.

Continuing the minimalist feel, the package ships with a matching grey Viewmaster 15in LCD panel. A 2.1 channel speaker system is bundled to supplement the multimedia features of the monitor, while the keyboard and mouse are designed in a similar style.

Inside, a 2.4GHz Pentium 4 CPU, matched with half a gigabyte of RAM, crunches through the numbers in good time. Our productivity tests produced above average results, especially in content creation benchmarks. The PC was also very stable and responsive throughout our rigorous testing process. Unfortunately, the 3D performance isn't much because of the lacklustre Gainward GeForce4 MX 450 card. The system only scored 2,167 3DMarks and had trouble maintaining 24fps in Unreal Tournament 2003.

But this system can still deliver the goods — it comes with a 7,200rpm 60GB Seagate Barracuda ATAV drive, and is both network- and Internet-ready. That's not bad for a mini-PC.

Details	
Contact	Hallmark
Phone	(03) 9540 8555
Online	www.hallmark.com.au
Price	$1,990
Business Winstone 2002	10 — 27.2 — 40
SYSmark 2002	100 — 229 — 250
3DMark2001 Pro	1K — 2,167 — 14K
Unreal Tournament 2003 dm-antalus	20 — 24.4 — 80
✔	Compact workhorse.
✖	Average gaming performance.
Verdict	●●●○○



Marvel

Gamers and graphics junkies are going to love this one. The M-Force 2700 XP from Marvel is built on nVidia's nForce 2 platform married to an AMD Athlon processor. Combine this dynamic duo with a Leadtek Winfast GeForce4 Ti 4800 AGP card with 128MB of video RAM, and you're in for some seriously fast results.

The M-Force 2700 XP powered through Vulpine's GLmark quicker than any other system, with a time of two minutes and 27 seconds and a frame rate of 70.5fps. Unfortunately, we couldn't get a final score from 3DMark2001, but going through the results of each component in the test, we estimate the final result would have been fractionally behind the EPC system.

The productivity results obtained when using an Athlon XP 2700+ processor paired with 512MB of 333MHz DDR RAM were a little higher than the results from the 2.4GHz machines. Scores of 33.8 in Business Winstone 2002, and 40.3 in Winstone Multimedia Content Creation are good, but not quite the best in the roundup.

The combination of nForce Southbridge and Western Digital WD800JB 80GB drive performed well, scoring close to the highest rankings under the WinBench 99 tests.

The nForce chipset also supplies an onboard 10/100 Ethernet adaptor and an internal Web Excel 56K modem. DVD and CD-RW drives are also installed.

Details	
Contact	Marvel
Phone	(02) 9680 9688
Online	www.marvelcomputers.com.au
Price	$1,985
Business Winstone 2002	10 — 33.8 — 40
SYSmark2002	100 — Incomplete — 250
3DMark2001 Pro	1K — Incomplete — 14K
Unreal Tournament 2003 dm-antalus	20 — 71.1 — 80
✔	Great graphics performance.
✖	Bland look, failed some tests.
Verdict	●●●○○



PC eXpress

The Avatar 2400 Plus from PC eXpress is a well-balanced system that combines reasonable productivity performance with good gaming potential. But that potential's not fully realised due to some poor input devices.

The first thing you notice about this bundle is the 19in Mitsubishi CRT monitor, which is about as flat a screen as you're likely to get in this price range. When connected to the GeForce4 Ti 4200 graphics card inside the case, you are presented with a clear, smooth motion video — particularly important for gaming. The hardware produced the third highest gaming performance figures, with 11,139 3Dmarks and over 200fps when playing Quake III Arena.

The two Winstone benchmarks delivered scores within the top 10% for this system, showing that the AMD Athlon XP 2400+ with 512MB RAM has more than enough grunt to get your work done.

Inside the case lies a Seagate hard disk drive capable of holding up to 80GB of data, plus DVD and CD-RW drives. An integrated 10/100 Ethernet means the system is ready for network connectivity.

Unfortunately, both the black keyboard and mouse feel plastic and cheap. The keys are very "clacky" when typing. These factors undermine an otherwise excellent PC.

Details	
Contact	PC eXpress
Phone	(02) 9584 0567
Online	www.pc-express.com.au
Price	$1,990
Business Winstone 2002	10 — 32.2 — 40
SYSmark2002	100 — Incomplete — 250
3DMark2001 Pro	1K — 11,139 — HK
Unreal Tournament 2003 dm-antalus	20 — 61.8 — 80
✔	Flat 19-inch screen.
✖	Poor quality input devices.
Verdict	●●●●○

Plus Corp

If you want the latest technology at a budget price, then this could be the machine for you. Plus Corporation has fitted this PC with a sparkling new Gigabyte GA-8IK1100 motherboard that utilises Intel's latest i875 (Canterwood) chipset, and offers a frontside bus speed of 800MHz.

Feeding the 512MB of DDR RAM at 400MHz, this combination was by a significant margin able to attain the highest score in PCMark2002's memory benchmark (7502).

Sitting a little further down in the case is a Leadtek Winfast A340TD graphics card featuring the GeForce FX 5200 GPU. The computer still churned out 6,859 3DMarks, which rates it on the higher side of average. Surprisingly though, the performance in Unreal Tournament 2003 was a little below what we expected, even though frame rates were continually greater than 35fps.

System data is stored on a 80GB Seagate 7,200rpm drive, which is supplemented by a 4KUS CD-RW drive.

The package is very well presented, too. The case, keyboard, mouse and 17in Philips monitor come in black, and all the manuals, CDs, cables, spare drive covers, and other odds and ends are neatly packed. The only downside to this otherwise attractive unit? A complete lack of DVD capabilities.

Details	
Contact	Plus Corporation
Phone	1800 007 587
Online	www.pluscorp.biz
Price	$1,999
Business Winstone 2002	10 — 28.4 — 40
SYSmark2002	100 — 222 — 250
3DMark2001 Pro	1K — 6,859 — HK
Unreal Tournament 2003 dm-antalus	20 — 43.6 — 80
✔	i875-enabled, professionally prepared.
✖	No DVD.
Verdict	●●●●○

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Can you spare another $200?

To get a system down to the $2,000 price point, some compromises have to be made. The performance of all the systems in this roundup can be improved with a few carefully selected upgrades.

Not a single machine submitted contained a dedicated soundcard. The PCs utilise onboard sound processors, and generally offer only stereo sound. DVD viewing is best with 5.1 channel sound. Cards which support this start from around $70.

In the engine-room, acquiring a CPU rated 300MHz faster than the 2.4GHz average, or adding another stick of 512MB DDR memory running at 333MHz will set you back around $150. Increasing the capacity of your hard disk by another 40GB should cost no more than $60. If your system did not come with a DVD drive, as little as $100 will get you one.

For better gaming, a card running either an nVidia GeForce4 Ti 4200, nVidia GeForce FX5200, or ATI Radeon 9500 GPU will cost approximately $200 more than the GeForce4 MX440-based cards shipped with the majority of systems. Upgrading a 17in CRT screen to either a 15in LCD or a 19in CRT will set you back around $200.

A simple colour ink-jet printer can be added to a system for as little as $70, while $110 will purchase a basic 600dpi scanner.

For this Labs Challenge, each vendor sent us a box designed to appeal to the needs of buyers restricted to a $2000 budget. But vendors can easily customise systems to suit your needs, especially if it gives them the chance to add a little extra to your spend. If you see a system that almost matches your needs, tell your vendor that you'd like to make a few changes and get a new quote.

Tang

The excellent 3D graphics performance of Tang's Pentium 4 Value Pack makes this a system which stands out from the crowd.

The package comes with a Gainward Ge4Force4 MX 440 AGP card, and the results that we got from this card were the best of all systems shipping with this GPU. Our 3DMark2001 score of 6,304 was only 408 marks below the Editor's Choice. In real-world tests at high resolutions frame rates were 10% higher than any other GeForce4 MX 440-based graphics subsystem.

Internally, the Tang bundle is similar to most of the other systems in the roundup, including a 2.4GHz processor from the Intel stable with 512MB of memory. In the drive bays we see the 80GB Western Digital WD800JB series drive, which rotates at 7,200rpm and utilises 8MB of cache to improve I/O performance.

Above this, the combination of a Pioneer 16x DVD and a Lite-On 52x24x52x CD-RW will read almost any optical media you can throw at it. Also included is a Samsung 17in CRT screen, with an internal 56K modem rounding out the offering.

The results of our productivity tests were average when compared to the other systems, although we did get an unusually low result in the Business Winstone 2002 tests.

Details	
Contact	Tang
Phone	(08) 9444 6088
Online	www.tang.com.au
Price	$1,950
Business Winstone 2002	10 **12.9** 40
SYSmark2002	100 **236** 250
3DMark2001 Pro	1K **6,304** 14K
Unreal Tournament 2003 dm-antalus	20 **56.5** 80
✔	Good 3D performance.
✖	Average productivity score.
Verdict	●●●●○

Technomart

A 19in monitor, a good graphics system and a very unusual name are highlights of the a.Populaire, but those aside this is a largely bland offering from Technomart.

The Philips 19in CRT screen is fed by a Gigabyte AGP card, which utilises a Radeon 9200 chipset. The tower is built with an AMD Athlon 2400+ CP and half-a-gigabyte of 333MHz DDR RAM. It produces some interesting results, especially in the gaming benchmarks.

Under our synthetic tests, Technomart's creation beat the GeForce4 MX 440 boxes by a nose — under 3DMark2001, there was only an average of 400 3DMarks between the two GPUs. In our real-world tests, the machine fell behind by around 10%.

It's interesting to note that the performance difference between running at high resolution and low resolution is much less significant with the Radeon 9200 chipset.

The USB ports mounted on the front of the case are deeply recessed, making it difficult to plug in USB devices with bulky plugs.

Inside, the Seagate 80GB drive supplies the equal-highest capacity of all systems in the roundup, and two 4KUS optical drives are also included — a 16x DVD-ROM and CD-RW drive that will burn at up to 52x. An internal 56K modem and Ethernet network interface also ship.

Details	
Contact	Technomart
Phone	(02) 9341 3366
Online	www.technomart.com.au
Price	$1,999
Business Winstone 2002	10 **28.1** 40
SYSmark2002	100 **159** 250
3DMark2001 Pro	1K **6,921** 14K
Unreal Tournament 2003 dm-antalus	20 **52.5** 80
✔	19in CRT screen.
✖	Bland aesthetics.
Verdict	●●●◐○



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The new generation of Oki Digital Colour Printers represents the next step forward for Oki. Every internal component has been redesigned – improved quality, higher-speed and even greater reliability and ease of use.

Oki is the market leader in single-pass digital LED technology. Applied to printing, this enables businesses of all sizes to enjoy superior printing speeds whether in colour or mono with exceptional reliability.

OKI C5000 Series

DIGITAL COLOUR PRINTER

- High speed 12ppm colour printing
- High speed 20ppm mono printing
- Auto double siding option
- 1.2m long banner printing
- Compact stylish design
- 600 x 1200 dpi resolution
- Lowest cost of ownership in its class

OKI C7000 Series

DIGITAL COLOUR PRINTER

- High speed 20ppm colour printing
- High speed 24ppm mono printing
- Auto double siding option
- 1.2m long banner printing
- Nice and easy media flexibility
- 600 x 1200 dpi resolution (7300)
- 1200 x 1200 dpi resolution (7500)
- Automatic multi-function driver tools

OKI C9000 Series

DIGITAL COLOUR PRINTER

- High speed 30ppm colour printing
- Hight speed 37ppm mono printing
- Auto double siding option
- 1.2m banner and A3 printing
- Nice and easy media flexibility
- 1200 x 1200 dpi resolution
- Automatic multi-function driver tools

OKI

1800 800 140
www.oki.com.au

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	Acer	Altech	AustComputerOnline	Cam1	Bluechip Intotech	CWS	Daitronics
Specifications							
Name	T310	Black Storm	—	—	—	—	—
Motherboard	Acer L455MG/651+	Soltek SL-85DR3-C	ASUS P4PE	Gigabyte GA-8ST800	AOpen AX4GR	ASUS A7N8X	ASUS P4S8X
Processor	Intel Pentium 4 2.4GHz @ 533MHz FSB	Intel Pentium 4 2.8GHz @ 800MHz FSB	Intel Pentium 4 2.4GHz @ 533MHz FSB	Intel Pentium 4 2.4GHz @ 533MHz FSB	Intel Celeron 2.4GHz @ 400MHz FSB	AMD Athlon XP 2600+ (2.08GHz @ 333MHz FSB)	Intel Pentium 4 2.4GHz @ 533MHz FSB
Memory	256MB 333MHz DDR RAM	512MB 400MHz DDR RAM	512MB 333MHz DDR RAM	512MB 333MHz DDR RAM	256MB 200MHz DDR RAM	512MB 333MHz DDR RAM	256MB 333MHz DDR RAM
Video card	Ultra AGP II (integrated on motherboard)	Abit Siluro GeForce4 Ti 4200 (128MB)	Leadtek WinFast A180 GeForce4 MX 440 (64MB)	Leadtek WinFast A180 GeForce4 MX 440 (64MB)	Integrated on motherboard	ATI Radeon 9700 Pro (128MB)	ASUS V9180 GeForce4 MX 440 (64MB)
Monitor	15in Acer CRT	17in Samsung Syncmaster 753s CRT	15in BenQ FP557 LCD	15in Syscan LCD	15in AOpen F55LS LCD	17in NEC Multisync V730 CRT	17in Samsung Syncmaster 753s CRT
Floppy	1.44MB FDD	1.44MB Sony FDD	1.44MB Panasonic FDD	1.44MB Panasonic FDD	1.44MB Panasonic FDD	1.44MB Panasonic FDD	1.44MB Sony FDD
Hard disk	40GB Seagate Barracuda 7,200rpm HDD	40GB Seagate Barracuda 7,200rpm HDD	60GB Seagate Barracuda 7,200rpm HDD	80GB Western Digital WD800JB with 8MB cache 7,200rpm HDD	40GB Western Digital WD400BB with 2MB cache 7,200rpm HDD	80GB Western Digital WD800JB with 8MB cache 7,200rpm HDD	80GB Western Digital WD800JB with 8MB cache 7,200rpm HDD
CD/DVD 1	Philips DVD/CD-RW Combo 8x DVD + 48x24x48x CD-RW	Samsung DVD/CD-RW Combo 16xDVD + 52x24x52x CD-RW	Sony 16x DVD	Lite-On CD-RW 48x24x48x CD-RW	AOpen 16xDVD	Samsung 16x DVD	Samsung DVD/CD-RW Combo 8xDVD + 32x4x8x CD-RW
CD/DVD 2	N/A	N/A	Lite-On 48x24x48x CD-RW	N/A	AOpen 42x24x52x CD-RW	ASUS 52x24x52x CD-RW	N/A
Keyboard	Acer PS/2 multimedia keyboard	A4 Tech wireless keyboard	Microsoft multimedia OEM keyboard	Microsoft multimedia OEM keyboard	AOpen KB-858P	Microsoft multimedia OEM keyboard	Microsoft multimedia OEM keyboard
Mouse	Acer USB optical wheel mouse	A4 Tech wireless mouse	Microsoft optical OEM mouse	Microsoft optical OEM mouse	A4 Tech optical	Microsoft optical OEM mouse	Logitech OEM optical mouse
Sound card	Integrated AC'97 stereo audio	Integrated Realtek AC'97 stereo audio	Integrated SoundMAX digital audio	Integrated Realtek AC'97 stereo audio	Integrated Realtek AC'97 stereo audio	Integrated nVidia nForce audio	Integrated SoundMAX digital audio
Speakers	Acer A301T 3-piece speakers (including sub-woofer)	820W 4.1 channel speakers	Creative 2200	N/A	Titanium speakers	1,500W subwoofer and speakers	Creative 2400 2.1 speaker system
Network	Integrated 10/100 Ethernet	N/A	Integrated ASUSTeK Broadcom 10/100 Ethernet	N/A	N/A	Integrated nVidia nForce2 10/100 Ethernet	Integrated SiS 900 10/100 Ethernet
Modem	ASKey 56K internal fax modem	N/A	N/A	Netcomm internal 56K	Internal 56K	N/A	Dynalink internal 56K
Operating system	Microsoft Windows XP Home Edition	Microsoft Windows XP Home Edition	Microsoft Windows XP Home Edition	Microsoft Windows XP Home Edition	Microsoft Windows XP Home Edition	Microsoft Windows XP Home Edition	Microsoft Windows XP Home Edition
Printer	N/A	N/A	N/A	N/A	N/A	N/A	Canon i320 Colour Bubble Jet
Scanner	N/A	N/A	N/A	N/A	N/A	N/A	Canon LiDE20 (USB)
Rear ports	2x USB, 1x serial, 1x parallel, 3x audio (in, out, mic), 1x joystick	2x USB, 2x serial, 1x parallel, 3x audio (in, out, mic), 1x joystick, S-Video out, DVI-out	4x USB, 2x serial, 1x parallel, 3x audio (in, out, mic)	2x USB, 2x serial, 1x parallel, 3x audio (in, out, mic), 1x joystick, S-Video out	2x USB, 2x serial, 1x parallel, 3x audio (in, out, mic), 1x joystick	2x USB, 2x serial, 1x parallel, 3x audio (in, out, mic), 1x joystick, S-Video out, DVI out	4x USB, 1x serial, 1x parallel, 3x audio (in, out, mic), S-Video out, DVI out
Front ports	2x USB, 2x audio (in, out)	2x USB	2x USB	2x USB	2x USB, 2x audio (in, out)	2x USB, 2x audio (in, out)	2x USB, 2x audio (in, out)
Labour warranty	1-year on-site	1-year return to base	1-year return to base	2-year return to base	N/A	1-year return to base	2-year return to base
Price	$1,999	$1,999	$1,994	$1,899	$1,999	$1,999	$1,999
Sandra							
CPU AU (MIPS)	4,379	6,213	4,831	4,364	4,532	5,699	4,500
CPU FPU (MFLOPS)	1,263	2,249	1,313	1,297	1,289	2,888	1,287
Integer Multimedia (it/s)	8,391	13,038	9,661	9,580	9,501	11,420	9,512
FPU Multimedia (it/s)	11,649	20,051	11,815	11,915	11,839	12,605	11,796
MDD Intelligent GG (it/s)	31,933	51,300	25,207	29,259	20,270	30,092	30,450
RAM Int Buffered (MB/s)	1,674	2,972	2,577	2,462	1,322	2,402	2,452
RAM FPU Buffered (MB/s)	1,658	2,970	2,576	2,462	1,646	2,239	2,464
SYSmark2002							
Overall	208	204	236	237	136	219	234
Internet content creation	291	373	321	326	196	270	312
Office productivity	149	112	174	173	94	178	176
Business Winstone MCC 2003							
Overall	Incomplete	26.6	41.5	41.7	24.4	43.8	42.1
WinBench 99							
Business Disk WinMark 99 (KB/s)	7,510	4,652	10,100	6,130	6140	7020	7,180
Business Graphics WinMark 99	306	301	571	301	108	955	684
Disk Access Time (ms)	15.2	15.2	11.7	15	14.1	14.8	14.1
PCMark2002							
CPU	5,694	3,419	5,980	5,959	5,745	6,300	5,906
Memory	4,136	4,362	5,782	5,416	3,385	4,806	5,645
HDD	867	1,015	890	1,147	1,053	1,189	1,237
PiFast							
Time (s)	4.44	6.38	3.8	4.01	5.58	3.67	3.88
Quake 3 Arena Demo1							
640 x 480 x 16bpp (s)	19	8.4	5.7	6.4	20.3	Incomplete	5.5
640 x 480 x 16bpp (fps)	70.8	159.5	236.1	212	66.4	Incomplete	246.3
1,024 x 768 x 32bpp (s)	Incomplete	4.4	3.9	13.3	44.9	Incomplete	3.3
1,024 x 768 x 32bpp (fps)	Incomplete	156.7	103.3	100.9	30	Incomplete	185.6
SPECviewperf 7.0							
3D Studio Max	Incomplete	5.188	6.13	5.904	3.678	Incomplete	6.126
Lightwave 5	Incomplete	6.257	9.445	9.6	6.72	Incomplete	9.828
Vulpine GLmark							
Setup time (m:s)	Incomplete	2:57	5:27	5:30	16:33	Incomplete	4:13
Average frame rate (fps)	Incomplete	58.7	31.4	31.1	10	Incomplete	40.8

DigitalStar	EPC	Forte	Hallmark	Marvel	PC eXpress	Plus	Tang	Technomart
IntelliPro 2400GX	Dream Machine	Fortress	Viewmaster iDealth	M-Force 2700 XP	Avatar 2400 Plus	Astra 641	Pentium 4 Value Pack	a.Populare
Gigabyte GA-8PE800	Soltek SL-75FRN2	Gigabyte 8IE800	Intel 845GERG2L	Leadtek WinFast K7 NCR18D Pro	ASUS A7N8X	Gigabyte GA-8IK1100	Soltek SL-85MR3-CL	Gigabyte GA-7VAX1394-A
Intel Pentium 4 2.8GHz@ 533MHz FSB	AMD Athlon XP 3000+ (2.17GHz @ 333MHz FSB)	Intel Pentium 4 2.4GHz @ 533MHz FSB	Intel Pentium 4 2.4GHz @ 533MHz FSB	AMD Athlon XP 2700+ (2.17GHz @ 333MHz FSB)	AMD Athlon XP 2400+ (2.0GHz @ 266MHz FSB)	Intel Pentium 4 2.4GHz @ 800MHz FSB	Intel Pentium 4 2.4GHz @ 533MHz FSB	AMD Athlon XP 2400+ (2.0GHz @ 266MHz FSB)
512MB 333MHz DDR RAM	1,024MB 400MHz DDR RAM	512MB 333MHz DDR RAM	512MB 333MHz DDR RAM	512MB 333MHz DDR RAM	512MB 333MHz DDR RAM	512MB 400MHz DDR RAM	512MB 333MHz DDR RAM	512MB 333MHz DDR RAM
Leadtek WinFast A180 GeForce4 MX 440 (64MB)	nVidia GeForce4 Ti 4200 (128MB)	Ezgo GeForce4 MX 440 (64MB)	Gainward GeForce4 MX 440 (64MB)	Leadtek WinFast GeForce4 Ti 4600 (128MB)	Pixlink PixelView GeForce Ti 4200 (128MB)	Leadtek GeForce FX 5200 (128MB)	Gainward GeForce4 MX 440 (64MB)	Gigabyte Radeon 9200 (64MB)
15in BenQ FP567 LCD w/ speakers	Magview 15in CRT	15in Viewmaster LCD with speakers	15in Viewmaster LCD with speakers	17in LG Flatron CRT	19in Mitsubishi Diamond View 1998FD CRT	17in Philips 107 CRT	17in Samsung Syncmaster 753DFX CRT	19in Phillips 109s CRT
1.44MB FDD	N/A	1.44MB Panasonic FDD	1.44MB Panasonic FDD	1.44MB Panasonic FDD	1.44MB Panasonic FDD	1.44MB Panasonic FDD	1.44MB Panasonic FDD	1.44MB Panasonic FDD
80GB Seagate Barracuda 7,200rpm HDD	80GB Seagate Barracuda 7,200rpm HDD	40GB Seagate Barracuda 7,200rpm HDD	60GB Seagate Barracuda 7,200rpm HDD	80GB Western Digital WD800JB with 8MB cache 7,200rpm HDD	80GB Seagate Barracuda 7,200rpm HDD	80GB Seagate Barracuda 7,200rpm HDD	80GB Western Digital WD800JB with 8MB cache 7,200rpm HDD	80GB Seagate Barracuda 7,200rpm HDD
Lite-On 16x DVD	Lite-On 52x24x52x CD-RW	LG 16x DVD	LG 52x24x52x CD-RW	Lite-On 16x DVD	Samsung 16x DVD	4KUS 52x24x52x CD-RW	Pioneer 16x DVD drive (with PowerDVD)	4KUS 16x DVD
Lite-On 52x24x52x CD-RW	N/A	LG 52x24x52x CD-RW	N/A	Lite-On 52x24x52x CD-RW	Lite-On 52x24x52x CD-RW	N/A	Lieon 52x24x52x CD-RW (with Nero)	4KUS 52x24x52x CD-RW
Logitech Internet OEM keyboard	OEM keyboard	Microsoft multimedia OEM keyboard	Viewmaster 2201 multimedia keyboard	AOpen OEM	Tsunami Runver-1000 (Windows keyboard)	BTC Smartoffice	Genius multimedia	Logitech Internet OEM keyboard
Logitech optical OEM mouse	Ritmo optical	Microsoft optical OEM mouse	Viewmaster M830 optical mouse	A4Tech 3D mouse	Tsunami Dolphin-2000 3D wheel mouse	Plus optical	Genius Scroll mouse	Logitech optical OEM mouse
Integrated Realtek AC'97 stereo audio	Integrated nVidia nForce audio	Integrated Realtek AC'97 stereo audio	Integrated SoundMAX digital audio	Integrated nVidia nForce audio	Integrated nVidia nForce audio	Integrated Realtek AC'97 stereo audio	Integrated AC'97 16-bit sound card	Integrated Avance AC'97 stereo audio
N/A	N/A	DKL SW205 600W speakers and subwoofer	Viewmaster 1100/2 subwoofer and speaker system	500W Natural Sound 2.1 subwoofer and speaker system	Tsunami XX-118A speakers	N/A	Genius 200W speakers	Creative SBS370 2.1 speaker system
Integrated Intel Pro 10/100 Ethernet	Integrated nVidia nForce2 10/100 Ethernet	N/A	Integrated Intel Pro 10/100 Ethernet	Integrated nVidia nForce2 10/100 Ethernet	Integrated nVidia nForce2 10/100 Ethernet	Integrated Intel Pro 10/100 Ethernet	Integrated 10/100 network card	Integrated Realtek RTL8139A/B/C 10/100 Ethernet
N/A	N/A	Connexant 56K internal	Netcomm internal 56K	Web Excel 56K internal	N/A	Dynalink internal 56K	Internal 56K v.90 modem	D-Link 56K internal
Microsoft Windows XP Home Edition	Microsoft Windows XP Home Edition	Microsoft Windows XP Home Edition	Microsoft Windows XP Home Edition	Microsoft Windows XP Home Edition	Microsoft Windows XP Home Edition	Microsoft Windows XP Home Edition	Microsoft Windows XP Home Edition	Microsoft Windows XP Home Edition
N/A	N/A	Canon S200SP Colour Bubble Jet	N/A	N/A	N/A	N/A	N/A	Canon S200SP Colour Bubble Jet
N/A	N/A	Genius Super 600 (USB)	N/A	N/A	N/A	N/A	N/A	Canon CK460 ex (USB)
4x USB, 2x serial, 1x parallel, 1x 6-pin FireWire, 1x 4-pin FireWire, 3x audio (in, out, mic), 1x joystick, S-Video out	2x USB, 2x serial, 1x parallel, 3x audio (in, out, mic), 1x joystick, S-Video out	4x USB, 2x serial, 1x parallel, 3x audio (in, out, mic), 1x joystick, S-Video out, composite video out	4x USB, 1x serial, 1x parallel, 3x audio (in, out, mic), 1x joystick	4x USB, 2x serial, 1x parallel, 3x 6-pin FireWire, 3x audio (in, out, mic), S-Video out, DVI out	4x USB, 1x serial, 1x parallel, 3x audio (in, out, mic), S-Video out, DVI out	6x USB, 2x serial, 1x parallel, 1x 6-pin FireWire, 1x 4-pin FireWire, 3x audio (in, out, mic), S-Video out, DVI out, composite video out	2x USB, 2x serial, 1x parallel, 3x audio (in, out, mic), 1x joystick, S-Video out	4x USB, 2x serial, 1x parallel, 1x 6-pin FireWire, 1x 4-pin FireWire, 3x audio (in, out, mic), 1x joystick, S-Video out, DVI out
N/A	2x USB	2x USB	N/A	2x USB	2x USB, 2x audio (in, out)	2x USB	2x USB, 2x audio (in, out)	2x USB
2-year return to base	2-year return to base	1-year return to base	N/A	1-year return to base	1-year return to base	1-year on-site	1-year return to base	N/A
$1,999	$1,999	$1,990	$1,990	$1,985	$1,990	$1,999	$1,950	$1,999
5,113	6,003	4,603	4,646	5,892	5,524	5,462	4,766	5,504
1,446	2,972	1,298	1,285	2,999	2,786	1,933	1,295	2,730
10,655	11,980	9,590	9,509	11,901	11,019	11,217	9,534	11,001
13,237	13,244	11,920	11,806	13,142	12,222	17,288	11,747	12,170
28,959	31,983	32,389	26,720	32,032	28,186	25,934	25,695	26,722
2,530	2,527	1,999	2,507	2,458	2,025	4,466	2,475	1,895
2,537	2,440	2,000	2,509	2,361	1,927	4,474	2,491	1,804
246	N/A	221	229	N/A	Incomplete	222	236	159
339	324	308	311	274	Incomplete	330	320	215
178	Incomplete	158	168	Incomplete	Incomplete	150	174	118
44.5	Incomplete	38.9	40.3	40.3	35.7	38.1	40.3	34.6
4,720	8330	4,900	4,710	9,280	8,680	6,190	7,780	4,650
573	1010	616	293	988	966	594	672	687
14.7	10.7	15.1	14.8	11.4	13.9	13	13.9	14.8
6,564	6,665	5942	5,909	6,587	6,004	5,987	5,910	5,838
5,735	5,415	4816	5,344	4,909	4,054	7,502	5,627	3,559
1,125	1,199	1034	780	1,055	907	931	1,131	995
3.61	3.16	4.09	3.97	3.67	3.97	3.52	3.88	4.23
5.3	4.8	5.9	9.1	5.1	5.7	4.9	5.4	6.8
254.5	281.1	228.3	148.1	264.9	235.8	273.3	248.1	197.9
11.9	5.6	9.1	29.7	5.6	6.2	7.3	8	9.2
113.1	244.6	141.7	45.3	241.5	217.7	186.5	168.6	146.3
5,819	7,398	5,488	4,708	9,008	7,904	5,469	6,123	4,62
9,294	12,86	8,364	7,377	11,67	11,51	10,68	7,876	8,782
6:04	2:29	5:28	13:00	2:27	2:32	4:07	4:45	2:57
28.2	69.7	31.5	12.9	70.5	68.1	41.7	36.2	58.6

WIRELESS &

INTRODUCING INDUSTRY FIRST 802.11g WIRELESS RANGE



XtremeG™ 11/54Mbps Wireless LAN PCI Adapter

- IEEE 802.11b Standard & IEEE 802.11g Draft Specification
- 2.4GHz Frequency Range
- Autosenses & Adjusts Speed to conditions for Maximum Performance
- 64/128-Bit Wired Equivalent Privacy (WEP) Security Support
- Support for IEEE 802.1x Security



XtremeG™ 11/54Mbps Wireless LAN PCMCIA Card

- IEEE 802.11b Standard & IEEE 802.11g Draft Specification
- 2.4GHz Frequency Range
- Autosenses & Adjusts Speed to conditions for Maximum Performance
- 64/128-Bit Wired Equivalent Privacy (WEP) Security Support
- Support for IEEE 802.1x Security



XtremeG™ 11/54Mbps Wireless LAN Access Point

- 10/100Mbps Fast Ethernet Interface for connecting to Wired Network
- IEEE 802.11b Standard & IEEE 802.11g Draft Specification
- Autosenses & Adjusts Speed to conditions for Maximum Performance
- Support for IEEE 802.1x Security
- 64/128-Bit Wired Equivalent Privacy (WEP) Security Support



22Mbps Wireless CardBus Adapter

- Compatible with IEEE 802.11b (DSSS) 2.4GHz Standard, Up to 20% better transfer
- 22Mbps with other AirPlus devices
- 64/128/256 Bit WEP Security
- Built-in Diversity Antenna
- Drivers for Windows 98, 2000, Me, NT & XP



11/54Mbps Dualband Wireless PCMCIA Adapter

- IEEE 802.11a (5GHz) and IEEE 802.11b (2.4GHz) Standard
- 72Mbps Turbo Mode IEEE 802.11a
- Autosenses and adjusts speed to conditions for max performance
- 64/128/152 Bit WEP Security



AirPlus Ethernet to Wireless LAN Client Adapter

- 22Mbps Wireless LAN Client Adapter which provides wireless communications for any Ethernet network device
- Suitable for any Ethernet Enabled device, e.g. Network Printers, Scanners, Internet Camera, Game Consoles & Set Top Boxes
- 10BaseT Interface for connecting to Ethernet network device
- Compatible with IEEE 802.11b (DSSS) 2.4GHz Standard



22Mbps Wireless PCI Adapter

- Compatible with IEEE 802.11b (DSSS) 2.4GHz Standard
- Up to 20% better transfer with 802.11b
- 22Mbps with other AirPlus devices
- 64/128/256 Bit WEP Security
- Drivers for Windows 98, 2000, Me, NT & NT
- Upgradeable antenna



11/54Mbps Dualband Wireless PCI Adapter

- IEEE 802.11a (5GHz) and IEEE 802.11b (2.4GHz) Standard
- 72Mbps Turbo Mode IEEE 802.11a
- Autosenses and adjusts speed to conditions for max performance
- 64/128/152 Bit WEP Security



22Mbps Wireless Concurrent Access Point & Bridge

- 4 Port 10/100Mbps built-in switch
- Access Point – AP Client – Bridge (Point-to-Point or Point-to-Multi Point) – Wireless Repeater
- Compatible with IEEE 802.11b standard
- DHCP Server/Client
- Web-based Configuration & Management
- Replaceable Antenna with reverse SMA connector for extending Wireless Range



22Mbps Wireless Access Point

- Compatible with IEEE 802.11b (DSSS) 2.4GHz Standard. Up to 20% better transfer
- 22Mbps with other AirPlus devices
- 64/128/256 Bit WEP Security
- Built-in DHCP Server
- Configuration and Management via Web Browser
- External 2.5db Antenna with Reverse SMA Connector



11/54Mbps Dualband Wireless Access Point

- Compliant with IEEE 802.11a (5GHz) and IEEE 802.11b (2.4GHz) Standard
- 10/100Mbps Fast Ethernet port for connecting to Wired Network
- Autosenses and adjusts speed to conditions for max performance
- 64/128/152 Bit WEP Security



22Mbps Wireless LAN Indoor AP/Bridge

- Ethernet to 22Mbps Wireless LAN Access Point or Bridge
- Modes of Operation(s): Access Point, AP Client, Bridge (Point-to-Point or Point-to-Multi Point)
- Advanced Enterprise Functions: DCS (Dynamic Channel Selection), AP Group, AP Load Balancing, AP Backup
- Wireless Repeater Operation Function
- Additional LAN Port for AP Backup Function
- Compatible with IEEE 802.11b (DSSS) 2.4GHz Standard
- DHCP Server/Client
- Web-based Configuration & Management
- Replaceable Antenna with reverse SMA connector for extending Wireless Range

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BROADBAND

INTRODUCING NEW RANGE OF PRODUCT



USB/Ethernet Combo ADSL Modem

- Connect single or multiple PC's via USB or Ethernet
- 10BaseT LAN interface – USB 1.1 interface
- Supports G.dmt and G.lite
- Built-in PPPoE and PPPoA Clients
- Ethernet Bridge Mode
- Configuration & Management via Web Browser
- Telstra Approved



22Mbps Wireless ADSL Modem/Router/Switch/ Access Point

- Connects single or multiple PC's on an Ethernet or Wireless LAN to ADSL
- Built-in 22Mbps Access Point, Router, 10/100Mbps 4 Port Switch, ADSL Modem
- Supports IP Routing, NAT, DHCP
- Configuration & Management via Web Browser, Telnet
- Telstra Approved



i2eye™ Broadband Video Phone

- Standalone Video Conference Operation (No PC Required)
- 10/100Mbps Fast Ethernet Port for LAN or Broadband Connection
- Video & Audio Out for Television Connection
- Streaming Video at up to 30 Frames/Second
- Adjustable Tilt & Focus Lens
- Built-in Micophone



22Mbps Wireless IP Router for DSL/Cable Modems with 4-Port 10/100Mbps Switch

- 22Mbps Wireless LAN Access Point
- Compatible with IEEE 802.11b (DSSS) 2.4GHz Standard
- 64/128/256 Bit Wired Equivalent Privacy (WEP) Security Support
- 10Mbps WAN Port for DSL/Cable Modem
- Support NAT for single IP Address & Firewall Protection
- Supports DHCP, VPN, PPP, PAP/CHAP Security
- Advanced Firewall Features
- Configuration & Management via Web Browser



22Mbps Wireless IP Router for DSL/Cable Modems with Switch and Print Server

- 22Mbps Wireless LAN Access Point
- Compatible with IEEE 802.11b 2.4GHz Standards
- Built-in 4 Port 10/100Mbps Switch, Single Parallel Printer Port
- Supports NAT, DHCP, PPP, VPN, PAP/CHAP Security
- DMZ selectable Port
- Advanced Firewall Features
- Configuration & Management via Web Browser



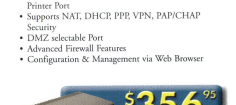
IP Router for DSL/Cable Modems with 4-Port Switch & Single Port Print Server

- 10Mbps Ethernet Port for DSL or Cable Modem connection
- 4-Port 10/100Mbps Switch
- Auto-Negotiation of MDI-II/MDI-X Cross Over for Easy Expansion
- Signal Parallel Port Print Server
- Support NAT for single IP address & Firewall Protection
- Supports DHCP, VPN, PPP, PAP/CHAP Security
- Built-in Telstra BigPond client



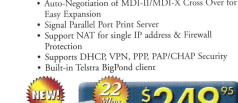
Ethernet ADSL Modem

- Connect single or multiple PC's on an Ethernet LAN to an ADSL service
- 10BaseT Interface (RJ45)
- ADSL Interface (RJ11)
- Support G.dmt and G.lite
- PPPoE (RFC 2516) & PPPoA (RFC 2364)
- Ethernet Bridge Mode (RCF 1483)
- Built-in PPPoE Client
- Configuration and Management via Web Browser
- Telstra Approved



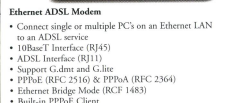
VPN Router for DSL/Cable Modems with 4-Port Switch

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- 4-Port 10/100Mbps Switch
- RS232 Serial Port for backup Analog Modem
- Internal DMZ (Demilitarised Zone)
- LAN-to-LAN VPN Connection (8 Tunnels Supported)
- Stateful Packet inspection (SPI)
- NAT for single IP Address



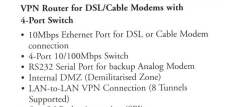
IP Router for DSL/Cable Modems with 7-Port Switch & Single Port Print Server

- 10Mbps Ethernet Port for DSL or Cable Modem connection
- 7-Port 10/100Mbps Switch
- Auto-Negotiation of MDI-II/MDI-X Cross Over for Easy Expansion
- Signal Parallel Port Print Server
- Support NAT for single IP address & Firewall Protection
- Supports DHCP, VPN, PPP, PAP/CHAP Security
- Admin via Windows based program, Telnet or Web Browser
- Built-in Telstra BigPond client



Ethernet ADSL Modem

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- Support G.dmt and G.lite
- PPPoE (RFC 2516) & PPPoA (RFC 2364)
- Ethernet Bridge Mode (RCF 1483)
- Built-in PPPoE Client
- Configuration and Management via Web Browser
- Telstra Approved



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SATA fails to sate



Serial ATA may be great technology but *David Lin* reckons it's not ready for prime time. See why none of these four SATA drives won an Editor's Choice award.

We had high hopes for this first Serial ATA drive Labs Challenge. The new interface technology has plenty to offer. Ample headroom for faster throughput, both now and in the future; a simpler cabling and connection system; and the ability to locate drives further from the motherboard to allow for better cooling.

The reality was disappointingly different. This first generation of SATA drives is based more on re-jigging existing PATA models, and our testing revealed little or no difference in performance between SATA and PATA drives, apart from SATA's higher price sticker.

The Maxtor and Western Digital SATA drives were the stand-outs: Maxtor for balancing price, performance and capacity, and WD for pure speed. Our recommendation? Wait another six months, when SATA drives can justify the price differential over parallel ATA.

How we tested

Our testbed was based on a 3.0GHz Pentium 4 CPU (with the 800MHz FSB), Gigabyte 8KNXP Ultra motherboard, 512MB of Corsair PC3200 DDR SDRAM and MSI GeForce4 Ti4200 AGP 8x card.

The choice of the Gigabyte motherboard was due to its ability to handle IDE, SATA/SATA RAID 0 and Ultra320 SCSI on board.

Each SATA drive was first subjected to HD Tach 2.61, which tests the raw drive, unpartitioned and unformatted, and measures random access time, as well as the read and write throughput. Each drive was then installed as a standalone with Windows XP Professional and all updates installed before the other benchmark tests were run. Subsequently, each drive was paired up with an identical drive in a RAID 0 (striped) array using the Canterwood's native ICH5R chip and the tests were repeated.

As a contrast, and reference, point we also ran a 250GB Maxtor MAXLine Plus II ATA/133 drive (hosted by a Promise ATA/133 controller card) and a 147GB Seagate Cheetah 10K.6 Ultra320 SCSI drive and tested these to mark how the SATA drives compared to other, more conventional technologies.

The Winbench 99 v2.0 Business Disk Winmark measures the transfer rate when performing short random reads and writes. It simulates normal office productivity applications.

The High-End Disk Winmark simulates a more complex mix of applications. Winmarks are measurements in KB/s (per sec). It also measures the load on the CPU.

Maxtor
Diamond Max Plus 9

Maxtor's recognisable branding of its Diamond Max families of drives extends to the SATA area. The company has a complementary line of ATA/133 drives under the Diamond Max Plus 9 label with both 2MB and 8MB caches, so be clear when ordering from suppliers.

Mechanically, most of the components between the SATA and PATA versions are shared. The only real difference is a change to the PCB and the accommodation of the SATA data and power connectors.

There's also a Molex power connector.

The first motherboards with SATA support that we saw didn't ship with SATA power connectors, although that seems to have changed with more recent boards.

Maxtor takes the same approach with the Diamond Max Plus as the WD Special Edition PATA drives by opting for the 7,200rpm spindle speed and stacking it with an efficient 8MB buffer.

The PATA heritage even extends to the jumper block for configuring master or slave settings which, of course, is redundant in SATA.

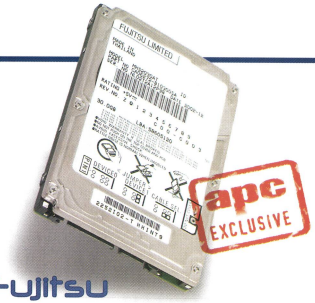
DM Plus 9 SATA performance was what we expected from these first generation SATA drives. In the crucial benchmarks, the DM Plus 9 was ahead of the higher capacity Seagate.

Even more encouraging was the low CPU utilisation score of 58% for a single drive. That cranked up to 73.5% when paired in a RAID 0 array, still a few points below the single Seagate Barracuda.

The Maxtor isn't the largest or fastest drive but it offers an attractive capacity at a good price with reasonable performance. It's the most balanced offering of the drives seen in this particular Labs Challenge.

It would've been nice, however, if the warranty was longer than just a single year.

Details	
Contact	Maxtor
Phone	(02) 9369 3662
Online	www.maxtor.com
Price	$285
Capacity	80GB
HD Tach random access time	13.1ms
Standalone	
Winbench Business Disk Winmark	3K 6,190 15K
Winbench High-End Disk Winmark	10K 24,500 40K
Winbench CPU Utilisation %	0 58.1 100
RAID	
Winbench Business Disk Winmark	3K 10,700 15K
Winbench High-End Disk Winmark	10K 35,300 40K
Winbench CPU Utilisation %	0 82.7 100
✔	Dual power inputs.
✖	Only one year warranty.
Verdict	●●●●○



Fujitsu MHS2030AT

This is the first Fujitsu SATA model to hit our shores. In fact, it was so new that it hadn't been announced on the local scene at time of writing. Even Fujitsu Australia's engineers hadn't had a crack, and there weren't any spec sheets or background literature.

What caught our attention was that this 30GB drive was a notebook-sized 2.5in, 4,200rpm unit rather than the conventional 3.5in desktop type. We've yet to see any notebooks designed for 2.5in SATA drives, but Fujitsu believes these will arrive within the next two years. These drives may even find their way into consumer appliances, such as personal video recorders.

To do so, however, these drives will need to get faster. The review models supplied were engineering samples, so their performance on the testbench can't be taken as indicative of the drives that will eventually roll off Fujitsu's SATA production line.

But it's clear that improvements must be made nonetheless.

Under testing, the Fujitsu was the slowest drive by a long margin, with access times six milliseconds slower than any other drive.

Moreover, for some reason the Fujitsu drives would not RAID. The motherboard BIOS identified the pair of drives but the Intel SATA RAID adapter insisted there was only one drive.

As a result, all RAID testing was done with the Promise FastTrak S150 TX2plus controller card. In its favour, the Fujitsu drive was the coolest to touch due to the lower spindle speed.

If Fujitsu is able to iron out the wrinkles of speed and RAID support, this could end up being a very sweet little drive.

Details	
Contact	Fujitsu Australia
Phone	(02) 9776 4776
Online	www.fujitsu.com.au
Price	$215
Capacity	30GB
HD Tach random access time	19.8ms
Standalone	
Winbench Business Disk Winmark	3K 3,780 15K
Winbench High-End Disk Winmark	10K 11,900 40K
Winbench CPU Utilisation %	0 10.7 100
RAID	
Winbench Business Disk Winmark	3K 6,040 15K
Winbench High-End Disk Winmark	10K 16,200 40K
Winbench CPU Utilisation %	0 73.5 100
✔	Coolest running drive.
✖	Slowest drive.
Verdict	●●○○○

See you later, PATA?

When is the right time to ditch the parallel ATA drive for a serial ATA drive? In the short term, adoption of SATA will be dependent on the supporting chipsets. For those not fortunate enough to possess a new motherboard with SATA support, there are a number of simple non-RAID SATA controller cards available for under $100.

Before switching fully to SATA, most manufacturers have PATA products scheduled for release up to next year. And they're mindful that SATA II — an upgraded standard that will double transfer rates to 300MB/s — is also due to appear some time in 2004.

The best way manufacturers can sway the the masses to the new interface is to drop the prices on their SATA models. SATA drives are burdened with a 10-15% premium over their PATA kin. At the moment there isn't the variety to choose from in SATA although we have sampled a 2.5in, 4,200rpm model from Fujitsu, and a 10,000rpm drive from Western Digital.

So who should make the move to early adoption of SATA? Although speed improvements have been made, desktop disk drives emphasise capacity and reliability. Our tests showed that speed gains over ATA/100 and ATA/133 are insignificant to the casual user. The usual suspects — hard-core gamers — gain virtually nothing as gameplay tends to avoid the storage subsystem and place heavy loads on the CPU, memory and graphics.

However, database and video users will benefit from the adoption of SATA, especially when two or more SATA drives are fitted in a RAID array. Theoretically, the SATA cabling means better airflow inside the box and the lower power requirements mean less likelihood of signal crosstalk or stress on your power supply. But bear in mind that these drives tend to run hotter than their PATA brethren. What you gain in airflow is cancelled by the extra heat generated by the drive.

If you're stuck for a SATA controller and don't feel up to shelling out for a new motherboard, there's no shortage of affordable controller cards available. *APC Labs* has used the the Kouwell PCI to Serial ATA RAID card (Verbatim, 03 9823 0999, $90), the Promise FastTrak S150 TX2plus (Westan, 03 9543 7733, $250) and Adaptec Serial ATA RAID 1210SA (LAN 1, 02 9319 6411, $129) to good end.

The main advantage in using one of these cards over the native SATA RAID support of the Intel Canterwood chipset is the extra functionality — such as a choice of RAID levels instead of plain RAID 0 as offered on the motherboard, or the ability to use more than two drives in your array.





Seagate
Barracuda V SATA

The Barracuda was the first desktop SATA drive to hit the market last year. At 120GB, capacity is generous, meaning it's the largest of our SATA drives. And it's leveraged the Barracuda V ATA family by retaining the 8MB cache and 7,200rpm spindle speed.

The Barracuda is unlike other 3.5in SATA drives because there's no four-pin Molex power connector with the SATA power connector. Nevertheless, it failed to excite us with its benchmark performance.

The closest comparison is the Maxtor DM Plus 9 SATA, but across almost all measurements the Barracuda was just a fraction down. HD Tach showed it to have an access time just 0.5ms below that of the DM Plus 9 (not something you would notice with the naked eye). It was also a tad faster than the Maxtor MAXLine ATA/133 drive.

Throughput in Winbench showed the Barracuda to be a touch below the Maxtor. It was pipped in the Business and High-End Disk Winmarks by the DM Plus 9 and a big difference was seen in the CPU utilisation time.

Storage vendors are forever striving towards a holy grail where system overheads are reduced to nothing, but this drive forced itself to occupy 75% of the CPU's attention.

In RAID, the overhead climbed to 92.4%. Business Disk Winmark fared better, but at a cost to relative efficiencies in the system.

The Barracuda also ran hot. We didn't measure the temperatures on the drives while running on the testbench. The drives were not enclosed inside a case — and the air-conditioned *APC* Labs had more than adequate airflow around the drive — but it was still hot to touch.

At $374, the Barracuda would be a good catch if it wasn't so easily outperformed by the $80 cheaper PATA drive we used as a benchmark.

Details	
Contact	Seagate Technology
Phone	(02) 8748 2700
Online	www.seagate.com
Price	$374
Capacity	120GB
HD Tach random access time	13.6ms
Standalone	
Winbench Business Disk Winmark	3K 5,510 15K
Winbench High-End Disk Winmark	10K 19,900 40K
Winbench CPU Utilisation %	0 75.7 100
RAID	
Winbench Business Disk Winmark	3K 11,800 15K
Winbench High-End Disk Winmark	10K 27,500 40K
Winbench CPU Utilisation %	0 92.4 100
✔	Generous capacity.
✖	Relatively slow and hot.
Verdict	●●●○○

Western Digital
Raptor WD360DC

This drive sizzled in more ways than one. It's the only 10,000rpm SATA drive so far and represents WD's toe-in-the-water for SATA as an enterprise-class storage solution. However there are some caveats: the Raptor runs as hot as a 10,000rpm Cheetah SCSI drive and it's only a single platter with 36GB capacity.

The Raptor's lineage owes something to the Special Edition Caviar line. Apparently WD simply shifted much of the PCB on the Caviars across to the Raptor, thus cutting development costs. The idea being that what worked for the phenomenally successful Caviar SEs would translate readily to the Raptor.

So, why the 10,000rpm spindle speed? WD doesn't have a SCSI product family. What WD appears to be aiming for is an enterprise product with the performance and reliability that IT gurus crave, but at a lower cost.

The jury is out on reliability, but an indication of WD's seriousness is the Raptor's five-year warranty.

This is without doubt the quickest SATA drive going, so we drew comparisons with the Seagate Cheetah 10K.2 (a bona-fide enterprise-class 10,000rpm Ultra320 SCSI drive). The straight shootout between these drives in a single-drive system was close. There was nothing between them in the Business Disk Winmark, but the Raptor gained the points in the High-End Disk Winmark.

The Raptor managed to pare down CPU utilisation to 10.5%, while the Cheetah hogged 90%. An adage of the last decade has been that SCSI offered a better solution because the dedicated SCSI processor offloaded most of the I/O grunt work from the CPU. This may not be true — a fact that will interest harried IT administrators anxious to spare CPU cycles on their servers.

Details	
Contact	Westan
Phone	(03) 9543 7733
Online	www.wdc.com
Price	$316
Capacity	36GB
HD Tach random access time	8.3ms
Standalone	
Winbench Business Disk Winmark	3K 9,640 15K
Winbench High-End Disk Winmark	10K 33,500 40K
Winbench CPU Utilisation %	0 10.5 100
RAID	
Winbench Business Disk Winmark	3K 13,600 15K
Winbench High-End Disk Winmark	10K 36,500 40K
Winbench CPU Utilisation %	0 63.4 100
✔	Fast and efficient.
✖	Expensive and hot.
Verdict	●●●●○


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Speed up your system

Speed. You know you want it. Here's how to get it. Forget lame tips like "add more memory" or "defrag your hard drive". You're about to learn the *real* tweaks, tricks and techniques of the experts.

By *Joe Cassels*
David Flynn
Jarrod Spiga
Serdar Yegulalp

Bootup

It all starts here, every time you hit that power switch, making this the first place to visit for speeding up your system.

Your PC's BIOS offers an almost bewildering array of options. The art is knowing which to poke and prod, and those settings worth bothering with. Done right, finetuning at the BIOS level can squeeze an extra 5% of performance from your system from the get-go. While this sounds like chump change, that 5% stacks on top of tweaks to other pieces of hardware and the operating system itself.

Several BIOS settings can shave seconds from the initial boot sequence. Making your hard drive the first boot device in the BIOS is obvious. Of course, you'll have to undo this if you ever need to run a diagnostic boot floppy or boot from CD.

If you have spare IDE channels, including slave positions, setting them to None will prevent them from being checked during the boot sequence. And many older motherboards still count up RAM as part of the Power On SelfTest (POST). It's important after a RAM upgrade but isn't necessary for every boot, so to save some time, disable this in the BIOS setup screen.

Here are some performance-tuning recommendations for specific areas of the BIOS.

15-16MB Memory Hole: ISA cards often require some dedicated system memory for their own purposes, so this BIOS setting ropes off 1MB of RAM between 15 and16MB. Most late-model PCs don't have ISA slots, and the more recent ISA cards don't use this slice of memory

BONUS CD SOFTWARE

This month's cover CD set includes a hand-picked selection of speed-up utilities, including most of the software mentioned in this feature. The roster has BIOS Wizard; RivaTuner and CoolBits for nVidia graphics cards; CacheBooster and CacheMan, for hard drive caching; FreeMem, RAMpage and MemTurbo II 2.1 to defragment your PC's RAM; TweakMASTER, to optimise your Internet connection; plus, full versions of the system supertuner Tweak-XP 1.27 (worth over $50) and Virtual CD 3.0 (worth $35).

anyway, so you can disable this BIOS option and claw back 1MB.

Be wary if you happen to be using Windows NT, 2000 or XP programs with Creative's Sound Blaster PCI 128 or Creative Sound Blaster Live, and play old DOS-based games. These cards drop to SB16 emulation mode for DOS titles and the PC will crash without that 1MB of memory. The workaround is to grab VDMSound from **http://ntvdm.cjb.net**.

Bank Interleave: Interleaving requests to memory sends data across the system bus to one bank of memory while simultaneously reading data from another bank. Without interleaving, only one memory module can be read from and written to in each memory cycle. The optimum setting is four-way interleaving, although if you're using a small amount of RAM you should go for two-way.

DRAM CAS Latency/DRAM Cycle Length: CAS latency time is the period between when the chipset requests data from memory and when the memory is ready to send the data across the bus. Short delays lead to better performance, although this pushes your RAM harder and can cause instability on cheaper memory modules, particularly if your system is overclocked.

DRAM RAS Precharge: Information stored in RAM is volatile, so a feed of current keeps the data alive. The precharge specifies how long the "flash" of juice takes during each RAS cycle. Lower precharge times speed things up, but if you go too low, the data stored in RAM will be insufficiently charged, leaving it with relatively weak signal strength. This leads to instability if the data can't be read from memory.

RAS to CAS Latency/R2C Latency: After the RAS cycle has charged memory, there's a short delay until the CAS cycle can start. Minimising this delay increases memory performance, but again can cause stability issues.

Fast R-W Turnaround: This reduces the slight delay when the CPU switches from reading from RAM to writing to it.

Read Around Write: Enabling this allows the chipset to issue read and write commands out of order from its R-A-W (read-around-write) buffers. This increases performance in memory and some other functions across the chipset's Northbridge.

Read Wait State/Read Latency: The chipset normally holds data from memory for one cycle before making it available to the hardware that requested it. Setting the delay to zero cycles obviously lifts performance, but can cause stability issues if data arrives before the requesting device expects it.

Refresh Interval/Refresh Mode Select: JEDEC (Joint Electron Device Engineering Council) standards specify that SDRAM and DDR RAM should operate with a minimum refresh rate of 64µs, but most RAM can handle less frequent refreshes. Increasing this setting to 128µs, makes RAM available for longer times, since it has to go through a refresh cycle only half as often. For notebook users there's an added bonus: the slower refresh rate lengthens battery life.

Video RAM Cacheable: On modern AGP cards, system RAM works with less bandwidth than the video card's SGRAM. Disabling this stops SGRAM caching and lets system memory use more Layer 2 cache on the CPU.

CAVEAT TWEAKER

The first principle of all system tweaking is: if you don't know what you're doing, don't do it. That especially applies to the BIOS, because an error could leave you with a PC that won't boot. We're not talking about a problem that's fixed by hitting Ctrl+Alt+Del and slipping in a bootable floppy. We're talking about no booting at all. Not even from a floppy. That's a worst-case scenario, but you need to know that it can happen.

We can't promise that every tweak in this feature will work, or that any given tweak won't crash your system and require a reset. Due to the sheer scope of the market in boards, chipsets, BIOS versions and associated components, no-one can give that guarantee.

With BIOS tweaking, the best technique is to change one setting at a time, then reboot and use the machine for a while. If everything appears to be running the way it should, drop back into the BIOS and make your next adjustment, and so on. Carrying out every change at once is begging for trouble.

It's safe to assume that the cheaper your components, the less room you'll have to push things that little bit further. Conversely, if you've invested in brand gear with a reputation for quality, you'll have more headroom.

CPU to PCI Write Buffer: If the CPU attempts to write directly to the PCI bus, it has to contend with anything else trying to access the bus. With this option enabled, the CPU can buffer data for transfer on the bus, letting it get on with other tasks.

PCI Master 0 WS Write: This option allows PCI devices to communicate directly with the PCI bus instead of having to wait for one clock cycle. Disabling it will improve your system's overclockability.

PCI Master Pipeline REQ/PCI Pipelining: This should be activated if you have hardware that uses framebuffers, such as PCI graphics cards, DVD hardware decoders, TV tuner cards and video capture cards.

Spread Spectrum: Is able to perform frequency modulation on the system clock to reduce electromagnetic interference problems caused by the system using a given frequency for too long. It can cause fluctuations in your CPU's core frequency, adversely affecting overclocking performance in particular.

CPU Drive Strength: This determines signalling strength across the front-side bus — the higher the value, the stronger the signalling. If you've overclocked your system, setting this to a higher value (such as 2 or 3) can increase CPU stability but will generate additional heat over the motherboard's Northbridge, which reduces stability. If you're happy to keep the chip at its rated speed, set the CPU drive strength to 1.

PNP Aware OS: This controls BIOS access to the PIC Programmable Interrupt Controller. For Windows 9x, ME, NT and Linux systems, whose kernels don't ACPI, it should be enabled. ACPI-aware operating systems such as Windows 2000 and XP should have this option disabled.

Windows startup

When the BIOS is done breathing life into the PC, Windows takes over. The problem is that it takes its time doing so, no thanks to a cadre of sneaky startup services and applets (often loaded by third-party software and hardware) that run every time you power-up your PC. Here's how to cut them down to size.

MSCONFIG MASTERY

Microsoft introduced the System Configuration Utility (aka MSConfig) into all versions of Windows from 98, but chose to hide it from users. Admittedly MSConfig was designed for helping tech support find and fix PC problems, but in the hands of a power user it's a superb tool that simplifies startup management.

And you need to manage the startup sequence because of all the stuff that loads while you're not looking. Little of it uses the Startup folder for this, choosing instead to bury itself in registry keys.

Obviously, the less time Windows has to spend launching this dime-a-dozen stuff, the quicker it can get you to a desktop that's ready for work or play. And that's where MSConfig comes in handy.

Launch it by typing msconfig in the Start menu's Run prompt (keyboard shortcut Win+R). The utility differs slightly between Windows versions but always does the same job.

Click Selective Startup, switch to the Startup tab and scroll through the list of entries. Uncheck any familiar items you can comfortably do without; you can always use MSConfig to reinstate them. The information in MSConfig also helps you determine where the actual startup entry exists so you can remove it from that folder or the appropriate registry key. And you can use MSConfig to edit system files including system.ini and win.ini, while the Windows XP version lets you disable system services.

SELF SERVICE

In addition to the more obvious clutter of startup applets, Windows 2000 and XP invoke "system services" which run invisibly in the background and take care of business under the hood of the OS. For example, Windows XP's Automatic Update relies on a service that periodically checks for new updates online.

Some services are must-haves, but many are optional and can probably be safely deleted. Most services occupy 1MB of RAM or more when running, so cutting back on the unnecessary provides an immediate pick-me-up.

The startup control centre is the Services Console. Right-click on My Computer and select Manage, then in the Computer Management navigation tree select Services and Applications, then Services. This reveals a list of all system services.

Each is flagged with its status and the Startup Type — automatical loading (usually during startup) or manual, whereby it must be launched by a user or by a program that controls it. Changing a service's startup mode to Disabled deactivates it entirely.

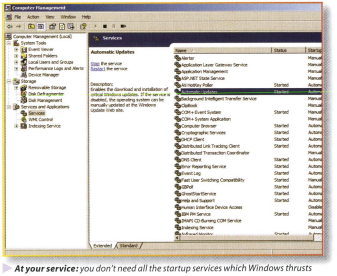
Double-click a service to view its properties. To turn it off, select the General tab and change the Startup Type setting to Disabled.

If you're unsure whether a particular service is needed, set the startup type to Manual. It will start only if needed. Must-have services should, of course, be set to Automatic. Bear in mind that systems differ and what may be essential in one setup could be peripheral to another.

Here's a quick list of services many users can almost certainly do without and disable, especially on a standalone PC. If you run into problems, simply restore the service.

- Alerter (receives administrator alerts).
- Automatic Updates (save RAM and bandwidth by checking the Windows Update site yourself).
- Background Intelligent Transfer Service (used by Windows Update) .
- ClipBook (allows Clipboard data to be copied between PCs).
- Distributed Link Tracking Client (ensures links to NTFS files on your machine or LAN remain valid).
- Error Reporting Service (automatic reporting of crashes to Microsoft).
- Fast User Switching Compatibility (allows different users to quickly log in and out of the same PC).
- Indexing Service (for local text content, for quick searching).
- Messenger (sends network broadcast messages).
- MS Software Shadow Copy Provider (works with the Volume Shadow Copy Service).
- NetMeeting Remote Desktop Sharing.
- Network DDE / Network DDE DSDM (Network Dynamic Data Exchange, used in applications like Remote ClipBook).
- Remote Desktop Help Session Manager (controls Remote Assistance).
- Routing and Remote Access (for VPN connections and inbound network links).
- Smart Card/Smart Card Helper.
- SSDP Discovery Service /Universal Plug and Play Device Host.
- Upload Manager (mainly for file transfers not managed by the user).
- Themes (turn off the eye candy and you can turn this off too).
- Volume Shadow Copy Service (supports network-based backup volumes).
- Web Client (for creating and editing files on the Web).
- Wireless Zero Configuration (if you don't have wireless, you don't need it).

For more on system services, see *APC* April, page 140.



At your service: *you don't need all the startup services which Windows thrusts upon you. Trim the list by choosing Disable or Manual startup mode.*

Graphics cards

Unleash the full potential of your graphics card by finetuning the following OpenGL and DirectX settings. ATI's Radeon Catalyst drivers expose these settings on the Display Properties window directly; for nVidia–based cards, try RivaTuner.

Many nVidia owners also favour CoolBits, a simple registry hack that exposes a set of hidden features programmed into the Detonator driver, including a tab for ramping up the clock speed of the graphics card core and memory.

We prefer RivaTuner, an application in its own right that offers more scope for souping-up the card. NVMax is another popular choice, but the creator of this program is no longer developing it and recommends RivaTuner to his customers. CoolBits and RivaTuner are both on this month's cover CD set.

The card's AGP speed should generally be set to the fastest rate your motherboard can handle, unless you experience stability issues, in which case reducing the AGP speed can get things back into a working state.

ENABLE FAST WRITE

The Fast Write option should be enabled to give a small performance increase by letting the CPU send data directly to the AGP without having to first buffer it in RAM.

CHIPSET OPTIONS

If you have a VIA chipset on your mobo's Northbridge and are running an nVidia-based card, turn on the VIA 4x AGP option. This optimises the chipset's Northbridge AGP performance.

VIA sideband addressing can generally be ignored, unless your motherboard is fitted with a relatively old VIA chipset.

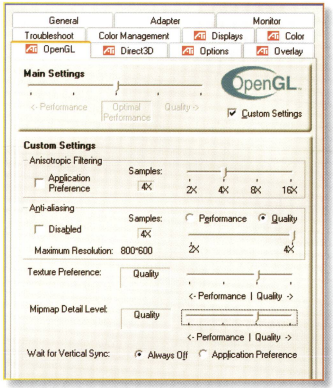
Similar to the VIA options, 2x AGP and sideband addressing are two options for users of the AMD 750 chipset. This chipset only natively supports 1xAGP, so enabling the first of these options is a quick workaround.

FILTERING COMPROMISE

Anti-aliasing (also known as full-scene anti-aliasing, or FSAA)reduces the negative visual effect of jagged edges, crawling edges and misaligned textures. Enabling the Application Preference setting allows 3D applications to use this function. FSAA improves image quality but at the expense of frame rate. Tests in *APC* Labs using Unreal Tournament 2003 at 1024 x 768 on an ATI Radeon 9700 Pro card saw frame rates drop by an average of 20% with 4x FSAA-enabled.

Antisotropic Filtering reduces texture aliasing and improves texture sharpness over longer distances in a 3D-generated scene by using a greater number of samples per pixel to render the displayed image. Naturally, the more samples made for each pixel, the better the image quality but the slower the performance.

Enabling the Application Preference option lets the game you're playing set the filtering level, although this can be overridden by manually specifying the level of filtering. Using the same test bench mentioned above, compared to using no filtering, we saw a 10% reduction in frame rate with 4x sampling, and a 14% slug using 16x. For the best compromise between quality and performance, with



Properties survey: *most OpenGL and DirectX settings can be configured under the advanced display properties.*

gameplay above 24fps, set the level of filtering to at least 4x samples per pixel.

The Texture Preference option relates to the quality used in rendering textures in applications. It can be adjusted to favour greater performance or better texture quality, or a mix of both. The gains are sporadic, however, as an application's texture settings will usually override these settings.

Setting MIP map Detail is done in a similar manner. This controls the sharpness of any MIP mapped textures rendered in a scene. High-quality settings will blur some edging a little, giving a more realistic appearance, although this will come at the cost of a few frames per second.

Truform smoothes out the hard edges sometimes found in games scenery. For example, without this feature enabled, sloping terrain can look rather "angular". Truform dramatically improves visual feel without much of a performance penalty.

ADJUSTING V-SYNC

Activating V-Sync will limit the highest frame rate to the monitor's refresh rate at any given resolution. This can improve visual quality, but those wanting the best of performance should keep this option turned off. When enabled, a further option is available — Frames Rendered Ahead will determine how many frames the video card will render before the frame is displayed on the screen. Generally, enabling V-Sync can cause input device lag, and rendering frames in advance can reduce the effect of this.

Hard drive

HARDWARE-LEVEL CACHING

One of the many less known settings in Windows controls whether write operations to the hard drive are cached. Cached writes allow for the system to write to the disk less often and more efficiently. The downside to this is that a power failure or system crash can cause data loss, so it isn't something you want to do if your PC tends to be less than rock-solid or if your area is prone to brown-outs.

To enable write caching, right-click My Computer, select Manage, and in Device Manager expand the Disk Drives portion of the tree. Double-click each hard drive to bring up their Properties page, and under the Policies tab select Enable write caching on the disk.

STAMP OUT THE NTFS TIME STAMP

Every time a file on an NTFS volume is accessed, the time and date of that operation is recorded as NTFS metadata. It's a feature that most people never use and can usually live without, and disabling this timestamp provides a small performance boost. To turn it off, open the registry and navigate to HKEY_LOCAL_MACHINE\System\CurrentControlSet\Control\FileSystem. Add or edit a DWORD value named NtfsDisableLastAccessUpdate and set it to 1, then reboot.

SMART PARTITIONING

When a hard drive writes data to the disk, it usually writes it as close to the outside of the disk as possible. This allows for faster read/write operations, as more physical data can pass under the head per rotation. To optimise disk performance you'll want to store frequently accessed files, and files that require faster access, on the outside edges of the disk. Likewise, infrequently accessed and archived files should sit closer to the slower centre of the disk.

Creating several partitions on a large-capacity drive provides better control of where the data is physically stored. For example, if you create three partitions, the first and outer-most could hold your operating system and the swapfile; the second, applications stored in the Program Files folder; and the third, documents, videos, audio and archived files.

This storage strategy boosts speeds and also makes it easier for backing up your data.

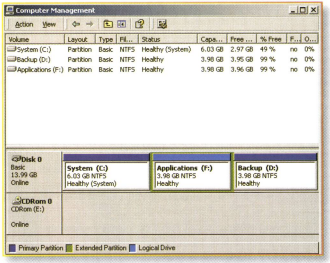
If you like this idea, but don't fancy reformatting your system, software such as PowerQuest's PartitionMagic can dynamically create and adjust partitions and leave all the data intact.

ENABLE DMA ACCESS

Your drives will run a lot faster if Windows is set up to permit direct memory access (DMA). In Windows XP, look for the primary and secondary IDE channels in Device Manager, right-click each channel and choose Properties. Select the Advanced Settings tab (which is available only if your hardware supports certain advanced features) and check "DMA if available".

In Windows 9x, right-click the hard drive in Device Manager, choose Properties and on the Settings tab, select DMA.

If the PC automatically falls out of DMA mode after rebooting, try removing the device from the Device Manager and then rebooting. Windows should detect the drive anew and this time toggle to DMA mode.



A place for everything: *a smart partitioning schema improves speed by giving more control over where data is physically stored on disk. It can also assist with your backup strategy.*

WORKING WITH PREFETCH

Windows XP has a cached repository of files (in \Windows\Prefetch) that's loaded at boot time and when certain applications are launched. This helps speed things up, but the Prefetch folder can become cluttered with rarely used or obsolete links. Delete all files in the folder, preferably before defragging your hard drive. Just be sure to reboot after the defrag so the cache can be rebuilt.

If your PC is stuck with low memory, such as 128MB, besides asking why you're running XP at all and why you don't pony up for some extra RAM, we suggest you disable Prefetch entirely. Dive into the Registry key HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\Session Manager\Memory Management\PrefetchParameters\EnablePrefetcher and set the value to either 0 or Disable.

SWAPFILE LOCATION

Many people with a single drive create a separate partition to hold the swapfile, to prevent fragmentation, but it actually slows the system down far more than if the swapfile and OS shared the same partition. The reason? The drive head has to travel further and realign itself across partition boundaries every time it needs to access the swapfile. This negates any of the performance boon gained back from having the swapfile less fragmented.

If you have two hard disks, ensure the swapfile is on the fastest drive. Even if both drives live on the same IDE channel and operate at the same speed, a little performance is gained from faster rotation speeds, lower seek times, lower latency and other advantages.

With two hard drives on separate IDE channels, you can strip the swapfile using a RAID-type technique to access both at once. It works well if you create a dedicated swap partition at the outer (fastest) edge of each drive. Open the System Properties applet in the Control Panel, click the Advanced tab, choose Performance, Settings, Virtual Memory and assign the swapfile a size on each drive.

DON'T OVER-ALLOCATE SWAP SPACE

Too many people think of swap space as a substitute for RAM rather than an adjunct to it. On your hard drive, 1GB of swap space doesn't magically give your system 1GB of memory. The reason it's called "swap space" is because it's a disk location for data in RAM memory to be swapped out to and then back from, when the PC's RAM is insufficient to the task. What goes out of RAM must come back in, and vice-versa, and if there isn't enough RAM to handle a too-large swapfile, the system will slow to a crawl.

A rule of thumb for allocating swap space is 1.5 x RAM. For example, if you've got 512MB of RAM, give yourself a 768MB swapfile. Much more than that will be overkill; it'll almost never be used and you'll be wasting hard disk space. Windows 2000 allows you to set a precise value for the swap space, while Windows XP lets the system manage the file size. System-managed space is fine, but for the least amount of disk chatter, pre-allocate a space the size of your RAM and then cap it at 1.5 times that.

MAXIMISE CONTIGUOUS FILE ALLOCATION SIZE

Files load fastest when sitting in a long strip on the drive rather than being broken into several smaller chunks. That's the idea behind defragging your drive. But because Windows doesn't always work with your best intentions in mind, here's how to force the OS to optimise the default setting for placing files in a large block — especially useful for disk-intensive apps such as graphics and video editors, and databases:

Drill down to the Registry key HKEY_LOCAL_MACHINE\System\CurrentControlSet\Control\FileSystem.

Create a DWORD value named ContigFileAllocSize, and set the value to 200 (hex) or 512 (decimal).

CHEWING THE FAT

The original File Allocation Table is a hold-over from the first disk drives (floppies, in the days before hard drives). A PC with Windows 98SE or Me should have its hard drives formatted as FAT32 , not the native FAT16, using Windows' bundled FAT32 convertor. Just be sure all your disk utility software supports the newer file system.

Given the choice between FAT and NTFS, which is the case with Windows 2000 and XP, most users opt for the reduced fragmentation and greater security afforded by NTFS. FAT-based hard drives on XP machines can be converted from the command line using

```
convert <drive letter>: /fs:ntfs
```

The most common reason for keeping a FAT-based disk is if a 9x machine needs to access the drive via a network, or if the drive is substantially smaller than 32GB. However, while NTFS is more robust and secure than the FAT32 file system, it can't always beat it for speed. The journaling and redundancy features of NTFS slightly hamper efficient file operations, and even with turning off NTFS's last-update time stamp or 8.3 name generation, FAT32 is still faster overall.

If you've got multiple drives or partitions, consider placing the OS and the swapfile on NTFS partitions and the programs on a FAT32 partition, especially if you don't need NTFS's file security features.

SERIOUS DEFRAGGING

Everyone knows the importance of defragging your hard drive, but the larger your drives, and the more you have, the more sense it makes to ditch the Windows defragmenter. It's slow, it can't manipulate system files or files locked for exclusive access, and it can't defragment NTFS metadata. It also has a tendency not to finish the job, at least not without multiple passes.

If you're serious about keeping your disks in top shape, try a third-party defragger like Diskeeper 7.0 (from www.execsoft.com), PerfectDisk 6.0 (**www.raxco.com**) or the Speed Disk module from Norton System Works (**www.symantec.com.au**).

LARGE DISK CLUSTERS

Not everyone uses their PC for exactly the same things, and sometimes you need to format partitions with that in mind. Windows 2000 and XP's NTFS file system let you use standard 4K clusters, but you can format drives with clusters as big as 64K. Why do this? For one, bigger clusters can be accessed faster. If you're using a partition primarily to store a few really big files, such as multimedia clips, large-cluster formatting gives a slight leg-up in performance.

To format a partition with 64K clusters, use the command

```
format <partition> /A:64K
```

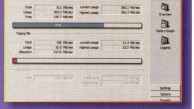
Other values are 512 (the default), 1024, 2048, 4096, 8192, 16K and 32K.

Windows 9x's FAT and FAT32 support clusters up to 128K and 256K, but 64K is probably the largest you'd want to use in any scenario. Note that third-party disk-checking and defragmentation tools may not work on non-standard cluster sizes.

BUDGETING YOUR CACHE

Windows makes an admirable stab at managing system caching, but no single cache setting works best for everyone, especially when it comes to the hard drive. Your CPU can crunch out millions of instructions per second and fling them around the system at lightspeed, but as soon as the hard drive comes into play, everything slows. That's why your toolkit needs to include a dedicated disk cache manager.

We've included CacheBooster and CacheMan on this month's CDs. Both programs give you finegrain control over disk cache settings to keep delays to a minimum, with the choice of convenient pre-sets plus full manual override for advanced users. CacheBooster 1.0 works only with Windows 95 and 98. The more comprehensive CacheMan 5.11 supports Windows 9x through to XP, with a Wizard-based optimisation routine for beginners.



Hard cache: *cacheMan makes is easy to finetune hard disk cache settings for Windows 9x through to XP.*

Memory

A common solution to performance woes is to throw more RAM into the PC. By any measure it's a fairly effective fix. You can immediately see and enjoy the benefits, and at around $200 for 512MB, it's a no-brainer. But wringing the full benefits out of your memory — even with the much-improved memory management systems available in Windows 2000 and XP — is a different story.

BUY THE RIGHT RAM

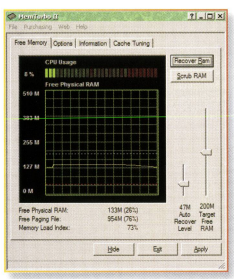
What kind of memory you buy and install in the first place can affect performance and system stability. Not all memory is created equal. No-name, super-cheap slabs picked up from the discount store or (shudder) the markets may not play nice with your PC.

One reason is manufacturer tolerances. The type of memory chips used in one maker's memory may be of a radically different quality of manufacture to another's. Another is assembly. Memory chips, boards and the controller logic that integrate the chips may all be from different manufacturers. If one company cuts corners, the whole chip will be less stable.

And even with memory at almost commodity prices, it still holds thatg you generally get what you pay for. Face it: with memory being so much cheaper these days, you can afford to pay a premium for a premium brand.

Cheap memory usually means an unstable system, which in turn can mean corrupted data and a trashed copy of Windows. Windows 2000, and XP even more so, are designed to stop cold if they detect memory parity errors. A memory module that ran perfectly on a Windows 9x machine may not pass muster under 2000 or XP. This may sound annoying, but it's a way for the OS to prevent bad hardware from causing data corruption. What's worse: investing a few bucks on replacing a knowingly defective memory module, or putting up with crashes and possibly data corruption?

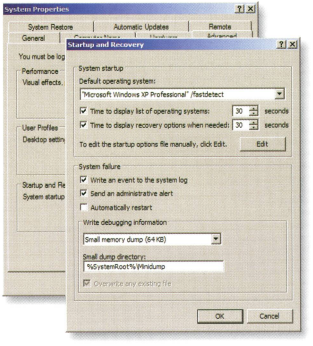
Several blue-screen-of-death messages commonly indicate bad memory. KERNEL_STACK_INPAGE_ERROR, KERNEL_DATA_INPAGE_ERROR, UNEXPECTED_KERNEL_MODE_TRAP and NMI_HARDWARE_FAILURE are usually caused by bad RAM. If you recently changed or upgraded your memory and find yourself on the receiving end of these errors, step back to your previous memory configuration and see if things restabilise.



Turbo time: *the graphic face of using MemTurbo to defrag your RAM*

Also, if you bought more than one DIMM, try running with one instead of two; if it's stable with one but not both, that particular manufacturer of memory doesn't agree with your motherboard.

Another symptom of memory errors in Windows XP is unexpected spontaneous rebooting, since by default XP is set to reboot instead of delivering a crash message. To set XP to show a crash error, right-click on My Computer, select Properties, Advanced, then Settings under Startup and Recovery. Under System Failure, uncheck Automatically Restart.



Effect and cause: *uncheck the Automatically Reboot option to show crash messages, which could have been caused by bad memory.*

ENABLE LARGE SYSTEM CACHE

Some OS settings are specifically designed to optimise memory usage. One is "large system cache" in Windows 2000 and XP. When a piece of program code isn't being actively used, Windows swaps the code out of user memory and into a system-maintained memory segment called the system cache.

If it remains unused for an even longer period of time, it's moved to the hard disk swapfile. This allows the system to maintain as much contiguous user memory as possible to launch and execute programs.

Windows has two cache sizes: large and small. The small cache is enabled by default, but if your PC has 512MB of RAM or more, you can reap the benefits of a large system cache.

To activate it manually, dive into the Registry and navigate to HKEY_LOCAL_MACHINE\System\CurrentControlSet\Control\Session Manager\Memory Management. Add or edit a new DWORD value named LargeSystemCache and set it to 1 (in decimal or hex), then reboot.

MEMORY DEFRAGMENTATION

This was rarely used until PCs started getting such large amounts of memory — and until Windows gained the ability to handle that much RAM. Memory fragmentation and disk fragmentation are very much the same. If many different blocks of memory are allocated and released, the remaining free memory is no longer contiguous, and is instead scattered and interspersed with memory in use. Since Windows can't allocate a block of memory unless it is contiguous, heavily fragmented memory can cause problems if a program tries to allocate large blocks.

When this happens, Windows performs "garbage collection" — moving together all the non-contiguous free memory into one free space and disposing of memory that is no longer in use.

However, Windows takes out the trash only at certain times, usually when the system has been idle for more than a few minutes, or when forced to do so by an application that demands a large block of memory and can gracefully handle the prospect of memory being fragmented.

Memory fragmentation is most problematic on servers, where the lack of a contiguous block of memory can cause some operations to not work very reliably (such as clustering).

To that end, a number of programmers have written utilities that force Windows to perform garbage collection and memory defragmentation.

Do they work? Yes, but you need to understand what this implies. Most of these programs force Windows to do a garbage collection by allocating and then immediately freeing up a large block of memory. This causes all the available memory to be consolidated, but it also causes applications that are running to have most of their code paged out to disk.

New applications launched after this point may load faster because they have space to load into, but programs already loaded will behave slowly at first, because they have to be paged back into memory to work. Depending on your work habits, you'll either find this a bonus or a burden.

WORTHLESS COMPRESSION

Memory defragmentation is entirely different to memory compression, which is widely recognised as being a nearly worthless gimmick. It involves using a device driver to compress and uncompress the contents of memory, much as a disk-compression driver does for files on a hard drive.

What little overhead is gained by compressing things in memory is lost, and then some, by the compression program itself — not just in terms of memory used but also the CPU overhead required to do the pack-and-unpack operations.

MemTurbo II (US$30) is probably the most famous and widely lauded of the memory defragmenters. Aside from on-demand memory defragging, it also performs cache tuning and allows you to set the depth and frequency of the memory scrubbing. This way you can either recover aggressively or conservatively, or on a fixed schedule.

Two popular and free alternatives are Freemem and RAMpage. Some programs include memory defragmentation and recovery (or cache-editing options) as part of a larger package, such as Tweak-XP.

WINDOWS TWEAKING TOOLS

There's no shortage of tweaking utilities for providing a friendly face to registry hacks for performance and customisation. After all, ticking boxes is a lot easier and safer than editing registry keys. But don't waste your time trawling through the dogpile. Instead, check out three of the best tweakers, which are all on this month's cover CDs, including a full working version of the excellent and award-winning Tweak-XP power tool.

Tweak UI

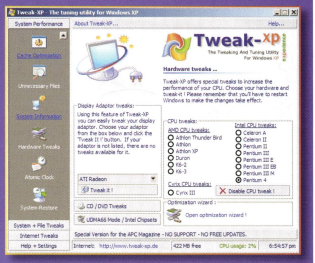
This classic freebie is part of the PowerToys collection cooked up by Microsoft's own Windows code-cutters in their spare time. While the tweaks lean towards customising the user interface, there are also a few raw speed-ups, making it ideal for beginners. There are separate versions for XP and 9x/Me/2000: both can be found on the CDs.

Tweak Manager

Boasting "1000+ powerful tweaks", the fixes in this US$30 shareware offering from the WinGuides Network span from the standard interface tricks to performance and security. The current TweakManager 2.11 release boasts a simple tree-like navigation menu and works with everything from 9x through XP, plus Office 2000/XP.

Tweak-XP

Perhaps the most highly regarded tweaking tool, Total Idea Software's Tweak-XP offers a huge number of performance tweaks for Windows XP plus your CPU, memory and cache settings, the graphics card, Internet connections and much more. You'll find a full version of Tweak-XP 1.27 (as sold for $53 on the cover CD, along with a 30-day trial version of Tweak-Me Gold for users of 9x/Me systems.



▶ ***High regard:*** *Tweak-XP is the ultimate power tool for Windows PCs, but don't take our word for it. Try the full version on our cover CD.*

Internet

CHOOSE SURF-FRIENDLY SETTINGS

Windows default networking settings lean towards what's best for networks rather than dialup networking, so several settings such as the TCP/IP Receive Window Size have been wound back to be LAN-friendly. Increasing the size of this "window" lets you send more data down the line in a single burst. Increasing the MTU (Maximum Transmission Unit) size is also held to have some benefits, although some users report no noticeable gains.

While you can adjust these settings in the Registry, a safer and smarter bet is TweakMASTER (**www.Tweakmaster.com**). This beauty easily lets you adjust Internet speed-related settings either by hand or using one of several pre-sets. It also caches commonly used DNS entries to save time when browsing. Be careful when tweaking settings for a broadband connection, as what's good for dialup isn't always good for ADSL. Check last month's broadband feature (*APC* June, page 86) for more details and some broadband-specific speed tips.

FINETUNING CACHE SIZE

The size of your browser cache affects browsing speed. Dialup users gain if most of the pages load from cache, in which case a larger folder is good. With a broadband connection, a huge collection of offline files can slow your browsing as Internet Explorer searches the cache for an offline version of the file. To finetune IE's cache size, choose Tools, Internet Options, click the Settings button on the General tab and move the slider to increase or decrease the size of the cache file. An 80MB cache will make for plenty fast browsing.

THE MORE, THE MERRIER

The HTTP 1.1 spec allows only IE browsers to open two connections at once to a Web server, a problem most typically seen when you're limited to two simultaneous downloads via your browser. A little Registry fiddling allows more connections to the same server and lets you use more of the bandwidth at your disposal.

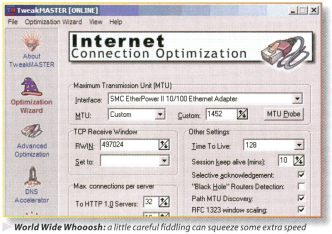
In Windows 9x, dive into the Registry key HKEY_CURRENT_USER\Software\Microsoft\Windows\CurrentVersion\Internet Settings\. In Windows 2000 and XP, burrow your way to HKEY_USERS.DEFAULT\Software\Microsoft\Windows\CurrentVersion\Internet Settings. Look for the DWORD "MaxConnectionsPerServer" and set the value to anywhere from four to 64 (try 64 for the best possible results).

SLAP DOWN THOSE POP-UPS

Pop-up ads are the speed humps of the Web. IE users can fly right over them with Popup Manager (**www.endpopups.com**) or Pop-Up Stopper (**www.panicware.com**). Both are free for personal use. Or try Mozilla, Netscape 7 and Opera 7, which all have built-in pop-up blockers.

NETWORK SERVICES YOU DON'T NEED

Windows 9x often loads more network services than a dialup connection needs. Several seconds roll by once the connection to your ISP is established before you can start to surf. Remove all but TCP/IP support: right-click your DialUp Networking, select Properties, click Server Type tab and disable support for NetBEUI and IPX/SPX. Also, turn off Log Onto Network. Now open the control panel's Network applet, highlight DialUp Adapter, click Properties, click Bindings tab and uncheck all items listed apart from TCP/IP.



World Wide Whoosh: *a little careful fiddling can squeeze some extra speed from any dialup or broadband Net connection.*

After all that, don't waste even more time loading a clunky home page. Set your browser's start page to something quick and useful like Google, apcstart.com (gratuitous plug!) or just make it blank. In fact, if you modify the shortcut for IE to have a "no-home" parameter, it won't even load the "about:blank" dummy page.

Windows also stacks several unnecessary services onto the TCP/IP connection. Spike these and there's more room for real Internet traffic.

NetBIOS is the most common offender. It's used on all TCP/IP versions as an adjunct to Windows networking, and can be disabled if you have only a single PC setup. This is easily done in Windows 2000 and XP: right-click the active network connection and select Properties, then select TCP/IP Protocol, click Properties, click Advanced, select the WINS tab and choose Disable NetBIOS over TCP/IP. It's not nearly as easy in Windows 9x, as that stack is less flexible.

If you belong to a workgroup you won't be able to browse for other computers without NetBIOS. You'll still be able to access them through a UNC address (such as \\server\folder) but they won't appear in the Network Neighbourhood.

Another for the dumpster is QoS (Quality of Service) Packet Scheduler, enabled by default in Windows 2000 and XP. This works with TCP/IP to guarantee that certain network services get priority. It's of little use on a standard desktop PC, so you can turn this off too.

DOWNLOAD FASTER

Download accelerators make fast work of file-fetching by opening several connections to a single file server (or in some cases, several servers at once) and splitting the file into small chunks that are downloaded simultaneously. The result is a speed boost anywhere from twice to five times as fast as normal download.

Caution: if the accelerator opens too many threads, you'll end up with slower downloads, especially over a dialup line. We recommend the freeware Fresh Download and the popular (albeit adware) Download Accelerator Pro. DAP is featured on our cover CD set.

Overclocking

Overclocking has come a long way since it debuted as an underground technique for squeezing extra grunt from CPUs. And while it may never make the mainstream, far more people are likely to tinker with their system's innards these days.

While *APC* doesn't spruik overclocking as either a must-do or a magic pill, we'd be remiss to ignore it in a feature about speed. Done right, it can deliver the greatest gain for absolutely no cost.

Just don't go overboard. Rampant overclocking leads to overheating systems, instability and damaged components. And of course overclocking to *any* degree will void your warranty.

With that in mind, here's the need-to-know on overclocking: exactly what's involved and what it can do for you. If this whets your appetite and you decide it's time to join the overclocking brigade, you'll find there's no shortage of Web sites that'll help you out if needed.

MULTIPLIER MAGIC

Intel and AMD processors operate at a speed equal to a multiple of the frontside bus speed. For example, Intel's Pentium 4 2.4GHz comes with a multiplier set to 12x because it's designed to run on the i875 and i865 chipsets. These sport a 200MHz frontside bus (although this is rated at 800MHz because the data paths allow four times as much data to be pushed through per clock cycle, hence the marketing tag of being "quad-pumped").

Multiply the 200MHz bus by a factor of 12, and you get the chip's speed of 2.4GHz. This is relevant in overclocking because the multiplier is locked to 12x, which keeps the chip locked at 2.4GHz. Unlocking the multiplier lets you rev the chip up to a higher clock speed.

It's incredibly difficult to unlock the multiplier on Intel CPUs, but some AMD chips (particularly those using the Thoroughbred core) can be unlocked by bridging a couple of contacts on the CPU itself, usually with a pen containing conductive ink.

Most overclocks are done by adjusting the frontside bus speed. This usually boosts the clock rate on most components in the system and can enhance the performance of all components. But a chain is only as strong as its weakest link, and as soon as one component can't handle the extra strain, the whole PC suffers.

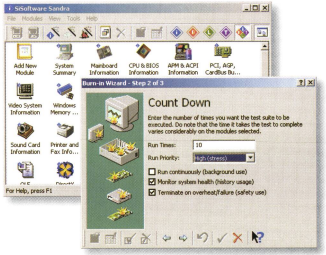
More advanced BIOSes allow you to set other system buses (such as the AGP/PCI and memory) to different speeds or speed multiples, to give you more control in selecting appropriate speeds for all components. Frontside bus overclocks are performed in BIOS, usually under the Advanced Chipset Features section.

More recent motherboard chipsets allow you to set the clock rate on the frontside bus in 1MHz increments.

Setting the speed of the AGP, PCI and memory buses is done either by a multiplier ratio or in 1MHz increments in more advanced BIOSes.

The last type of overclock relies on software and is predominantly done on graphics cards.

Applications such as PowerStrip, NVMax, CoolBits and Rage3DTweaker (which are all included on this month's cover CD set) let you dynamically adjust the GPU core and memory frequencies on your graphics card.



Before you burn it: *burn-in tests in applications such as SiSoft's Sandra simulate system stress, revealing possible instabilities.*

SMALL STEPS

When performing any kind of overclocking, take your time and increment the speed in small steps rather than ramping it up in one big hit. This limits the chance of frying your hardware, and also makes it easy to wind down the wick if things start to go awry.

Each time you perform an overclock, give the system a long "burn-in" period to ensure it's running in a stable manner with appropriate temperatures. Benchmarking utilities are a good test: running multiple iterations of 3DMark will give your graphics card a solid workout, while utilities such as SiSoft's Sandra and Hot CPU Tester have specific burn-in tests.

You can monitor system temperatures using tools like Motherboard Monitor (included on this month's cover CD set). Benchmarking apps can also be used to gauge how much of a performance increase you've gained with your overclock.

UP AGAINST THE WALL

Eventually you'll hit a wall. Either the PC will fail its power-on self-test, it will become unstable, you'll start to see artefacts in graphics applications, or the system temperatures will get too high.

If you've been pushing your machine further in small increments, the changes made will usually give an indication of what components are causing the failure so you can take appropriate action. For example, if the CPU is struggling, raising the CPU voltage slightly may improve things. However, this will also increase the CPU's core temperature, so be sure your CPU cooler can take the load.

HOT UP YOUR HANDHELD

There are plenty of ways to speed up your handheld, too. Turn to page 142 for a serve of speed-up tips for Palm handhelds, and page 146 for Pocket PC supercharges.

More speed

You want *more* tips? You got 'em. Here's a selection of choice cuts from our resident speedsters.

DEEP-SIX SYSTEM RESTORE

System Restore runs in the background in Windows Me and XP, and it's a terrific feature. Make a mistake involving a system setting or driver and you can roll right back to a previous working configuration. But it does come with some overheads. If you can live without that safety net, disabling System Restore will win you back a bit of memory (because the service is no longer constantly monitoring your drives) and a lot of hard disk space (for these snapshots, as well as extra space demanded by the option to undo a restore).

Make the change by running System Restore (found in the Start Menu's Accessories/System Tools folder) and choosing System Restore Settings; or right-click on My Computer, select Properties, then select the System Restore tab.

If your system doesn't seem to be experiencing problems, you can usually get away with nixing System Restore completely. If you have two hard drives and are a little more cautious, disable it on non-system drives and pare back its space consumption on your Windows partition to something more manageable.

Select your non-system drives, click Settings and check Turn Off System Restore on this drive box. For your system drive, select it, click Settings and drag the slider all the way to the left. The amount of space used by System Restore is a percentage of the free drive space, so on a big drive the 0% setting is still a lot.

DITCH THE EYE CANDY

An oldie but a goodie: get rid of XP's interface overkill. It's easy to do and we'd bet dollars to doughnuts that once you experience the extraordinary boost to your PC's responsiveness, you'll never go back.

The fastest way to shut down all of XP's visual enhancements is to go to the Appearance tab of the Display Properties window and select Windows Classic style in the Windows And Buttons dropdown. Also click the Effects button and uncheck all the effects you find distracting or not necessary, especially the transition effects box.

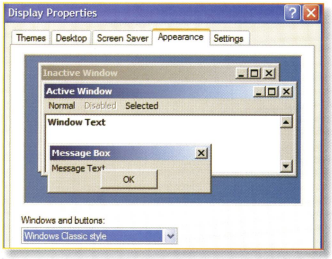
In Windows 2000, clicking Effects allows you to turn off the most bothersome stuff. The equivalent to free up display resources in 9x is to right-click the desktop and choose Properties, Effects and uncheck all the visual effects.

Users of 9x should also visit display properties and drop down to High Color, which frees up resources without affecting the appearance of photos and video clips.

WAKE UP TO HIBERNATE

The standby and hibernate features in Windows 2000 and XP can be great timesavers, allowing you to return your PC to the state when it was switched off — with the same windows open and apps running — rather than perform a full boot from scratch. But hibernate, in particular, is not for everyone.

Standby allows the quickest shutdown and recovery, as the PC "freezes" the RAM data and keeps it alive with a trickle of power. Hibernate (select by hitting the Shift key when shutting down) is much slower. It copies the contents of RAM to the hard disk before going into a no-power state, and then copies the data back from disk to RAM when it wakes up. The more RAM your PC has, the longer this takes.



Sugar-free: *You're now just one click away from the easiest and cheapest speed boost ever for Windows XP, by swapping that garish glam GUI for the sleek, scaled-back 'Windows Classic' look.*

Hibernate is the default action when you close the lid on many notebooks because it has no impact on battery life. But with today's notebooks offering many hours per tank, standby is the better choice. It's a lot faster, and when you open your notebook, you want to get right to work.

Some desktop users with 512MB or more of memory find it's often faster to reboot than use either Standby or Hibernate because of the sheer amount of data that has to be read back from the hard disk.

If you don't intend using Hibernate, disable it and claw back some disk space. The data residing in RAM is written to and read from the hidden system file hiberfil.sys in the root directory of your hard drive.

This file's size equals the amount of RAM you have, so on a PC with 512MB of RAM you can get back 512MB of disk space. Open the Control Panel's Power Options applet, choose the Hibernate tab and uncheck Enable Hibernation.

WINDOWS KEYBOARD SHORTCUTS

We're amazed by how many people still don't know the super shortcuts for keyboards with the Windows key. They let you keep your fingers on the keyboard and stay in the fast lane. Many novices are more familiar with these shortcuts than power users, because older hands have grown up without the Windows key so it's not part of their "muscle memory". Time to change that. Here are the six most useful shortcuts:

- +D: minimise all windows so you can jump straight to the desktop
- +E: run Windows Explorer
- +F: open the find/search window
- +L: logoff the current user
- +R: launch the Run command line box
- +Pause: open System Properties

FIREWIRE NETWORKING

PCs increasingly come fitted with FireWire adaptors. Windows XP treats these as network controllers. If you have two FireWire-equipped PCs, you can use that as a quick-and-dirty network. It's many times faster than Ethernet (1394 runs at a true 400Mbit/s whereas most in-house Ethernet tops out 100Mbit/s), so it's great for quickly copying files.

You can also set up Internet connection sharing over FireWire if one of the PCs has Internet access. The ICS wizard natively recognises a 1394 adaptor as a network interface, so setting up the two machines should be a snap. It may not work if the PCs are more then five metres apart.

USWC MODE FOR VIDEO

USWC is a new method of caching for video memory. Short for Uncacheable Speculative Write Combining, it isn't supported on all machines or video cards, but models that do support it should definitely use it.

You need both a video card and a motherboard that supports this option to take advantage. Some motherboards, from ASUS, for example, have USWC as a standard item.

If supported, your motherboard will have a BIOS option for enabling USWC. Don't attempt to enable this on a system with a video card that doesn't support it or the system may become unbootable.

QUICK ADMIN SETUP

If you've set up separate administrator and user accounts in Windows XP and want to install a program that can be accessed by all users, save time logging off as a user and back on again as administrator by temporarily giving yourself administrator permission.

When logged on as a normal user, hold down Shift and right-click the program's setup or install file. From the pop-up menu choose Run As, then enter the administrator username and password. This works for any executable, but requires XP's Secondary Logon Service running to access Run As in the context-sensitive menu.

CHANGE THUMBNAILS DEFAULT

Some people keep a lot of images on their systems and use the Thumbnail folder view to browse them. But even on a fast computer, it takes a long time for the thumbnails to regenerate. This is partly because the code uses default settings that waste CPU power. Explorer also gets "tied up" with thumbnails and doesn't allow other actions until it finishes.

Two controls change thumbnail settings, one for the size per side in pixels, and the other for the quality index. The thumbnail generator uses JPEG compression, and the quality index tells the compressor how much information to throw out to produce the image.

Since these are thumbnails and high quality isn't needed, you can turn this setting down all the way and lose nothing.

Open the Registry and navigate to HKEY_CURRENT_USER\Software\Microsoft \Windows\CurrentVersion\Explorer. Add a new REG_DWORD value named ThumbnailSize and set it to the maximum size on a side, in pixels, that you want to use. To change the quality, add a new REG_DWORD named ThumbnailQuality and set it to a number from 1 to 100. Start with 1.



Most modern PCs have dual optical drives — usually a CD burner and a DVD player —each connected to different IDE channels. That's a throwback from the days when drive manufacturers recommended split channels to reduce the risk of bandwidth contention (which could turn blank CDs into drink coasters).

Most writers now have buffer underrun protection, so it's no longer a problem. However, all drives on an IDE channel run at the speed of the slowest device. If you've got a CD drive capable of transferring data at ATA33 on the same channel as an ATA100 hard drive, the hard disk is forced to crawl along at ATA33 speed. Our recommendation is to connect all hard disks to the primary IDE channel, and all optical CD drives to the secondary channel.

Even the fastest CD drive is a laggard compared to hard disk speeds, so why tie yourself down? If you've got room, copy the contents of your most often-used CDs onto your hard drive. Of course, it's not always that simple: many CDs must have their own drive letters to install and run correctly. Get around this by using the Windows utility subst.exe to map a drive letter to the folder containing the CD files. In Windows 9x the file lives in windows\command folder; in Windows XP it's in windows\system32.

To map the drive letter to a folder under Windows 9x, create a new shortcut with the target of:

```
c:\windows\command\subst g: c:\virtual
```

where g is the drive letter you want to use and c:\virtual is the folder where you copied the CD files.

For Windows XP, the target should be:

```
c:\windows\system32\subst.exe g: c:\virtual
```

Launch the shortcut, then open My Computer to check the drive letter has been properly mapped. Now drag the shortcut into the Start Menu's Startup folder so it runs whenever you start your PC. With the drive letter mapped, install the CD-ROM from its folder.

If it still doesn't work, you'll need to employ software that emulates a CD-ROM drive. We recommend Virtual CD, and you can find a full working version of Virtual CD 3.0 for Windows 9x and 2000 on this month's cover discs (if you use Windows XP you'll need to upgrade to the latest 5.0 release).

Virtual CD creates several emulated CD-ROM drives into which you can load CD images copied to the hard drive. Because you're actually making a CD file on your hard disk rather than merely copying the data, this circumvents most copy-protection systems. All you need to do then is load the image into a Virtual CD drives and install the CD in the usual way.

And to skip the delay caused by the Autorun feature, hold down the Shift key for a few seconds when inserting a disc.

DROP THAT FLOPPY

Most computers reserve an IRQ for specific devices. It's a throwback from the days when all IRQs had to be assigned by hand, and certain devices were always factory-assigned certain IRQs. This still persists, although in a vastly reduced form.

One of the standard interrupts the PC pre-reserves is for the floppy drive. If you don't often use the drive or no longer use one at all (many people use CD-RWs or other floppy substitutes these days), check your system BIOS for an option for decommissioning the floppy IRQ. This doesn't prevent the floppy from working entirely. It just allows its IRQ to be shared with other devices. Since the floppy drive sits idle the vast majority of the time, there's no reason for its IRQ not to be re-allocated when needed.

You can also set Windows 9x to ignore the floppy drive when you really don't need it. Stop 9x from checking for new floppy drives during startup by right-clicking My Computer and choosing Properties, Performance tab, File System and Floppy Disk tab. Clear the box marked "Search for new floppy disk drives each time your computer starts".

HARD-ASSIGN YOUR NIC

Most network interface cards automatically detect if they're connected to a 10 or 100Mbit Ethernet, half-duplex or full-duplex. Algorithms for autodetection vary enormously between manufacturers. Some cards don't correctly detect network media, while others disconnect and reconnect spontaneously if set to autodetect.

The best deal is to determine exactly what network media you have and then hard-assign your NIC accordingly. The method for this varies from card to card, but most allow you to change the media type in the Advanced tab of the card's hardware properties page.

ONE-CARD BUS MASTERING

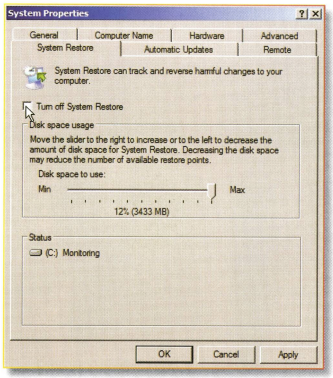
Network cards that perform bus mastering — sometimes referred to as "PCI bus efficiency" or "bus offloading" — shouldn't be allowed to interfere with each other. One card in a system is fine, but with more (such as on a server or a house router), they may interfere with each other and other devices.

Disable bus mastering for all but one such card — or even all of them, since bus mastering for network cards doesn't always provide a significant performance improvement. How this is done will vary from card to card — check with the manufacturer.

NEGATIVE DNS CACHING

If you've visited a Web site, failed to get through and been unable to connect again even though other people can, odds are you've encountered a cached DNS failure. When a DNS query fails, the system caches it so it doesn't waste future lookups in too short a time. But the default timeout period of 33 seconds can be way too long.

Edit the Registry key HKEY_LOCAL_MACHINE\System\CurrentControlSet\Services\DnsCache\Parameters and add a new DWORD key NegativeCacheTime, set to a value of 60. This controls, in seconds, how long each negative cache entry persists. You can even set this to 0, although that's not really recommended.



System Restore, RIP: *If you can do with out Microsoft's security blanket, disable System Restore to win back resources and hard disk space.*

ADJUST ARP CACHE FOR LANS

This one is for those with a LAN with a lot of workstations. ARP is a protocol used by TCP/IP to bind a network interface's MAC address to an IP address. Every time a Windows 2000 machine makes an ARP binding, it's cached, but the cache lifetime is usually way too short for most LANs.

If you have a LAN with lots of wireless-networked machines, a short ARP cache life is good, since wireless devices detach from and reattach to the network constantly. However, if you have many machines which rarely change addresses, ARP cache lifetimes can be raised.

Open the Registry and navigate to HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\Tcpip\Parameters. Add or change the DWORD value ArpCacheLife Pand set it to the time, in seconds, that each entry lives in the cache when not in use. Add or change the DWORD value ArpCacheMinReferencedLife and set it to the maximum length of time for a cache entry to live when in use.

PUMP UP DA PENGUIN
Looking for ways to give your Linux distro a bit of a leg-up? Turn to page 130 for a flock of fast-minded tips.



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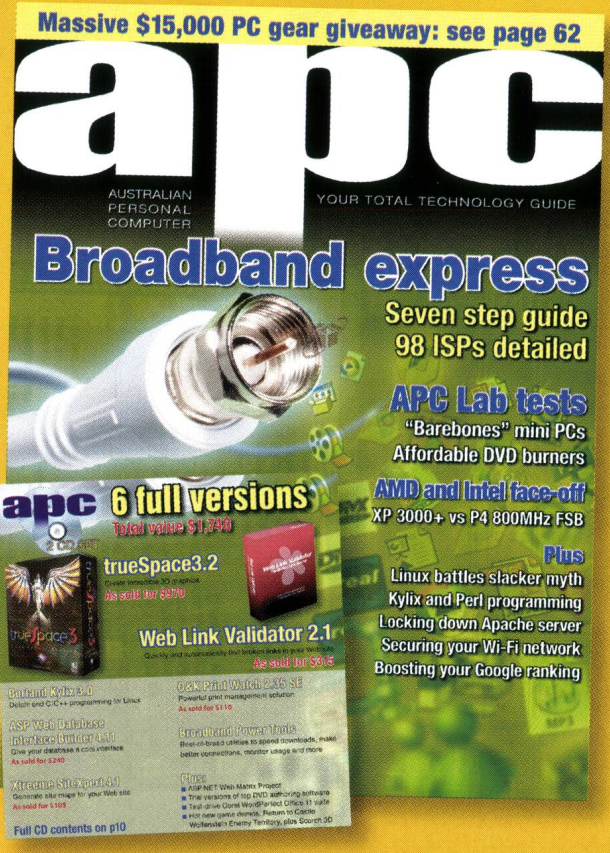
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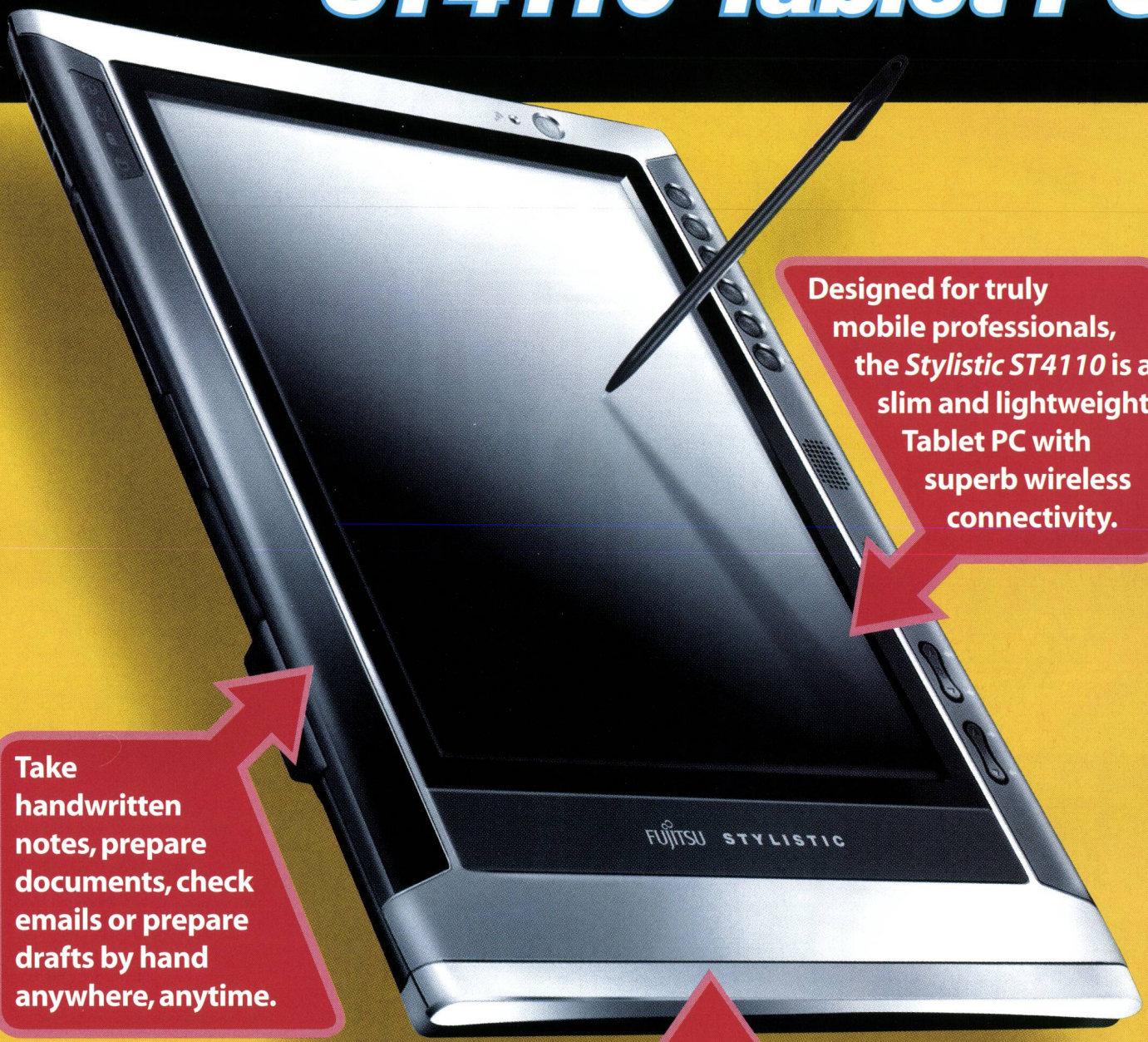
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The XML revolution

XML — eXtensible Markup Language — is an exciting prospect, but exactly what it means depends on who you talk to. *Simon Sharwood* explores the new language of ebusiness.

You'd be hard-pressed to find a technology as universally applauded as XML. Microsoft and the open source movement both love it. So do IBM and Sun, along with big business and humble bloggers. That's a lot of love in an industry accustomed to picking sides and waging ferocious turf wars.

The reason? XML's ability to allow the creation of self-describing data that's universally comprehensible, regardless of platform or application. Analysts and vendors predict that XML will become the world's dominant data format and could even spark a new type of computing: spontaneous, temporary connections between applications running on any type of device, to exchange information and conduct transactions when, and as, needed.

While this vision is compelling, it will come to fruition only after an extraordinary amount of work and cooperation. The machinery needed to realise XML's potential is very complex, and while it's still only half-built, disagreements about how to build the rest are not uncommon. Plus, new pieces are regularly being proposed.

SETTING STANDARDS

XML is the latest in a 30-year line of markup languages. It describes documents, thus allowing easier categorising and sorting by machines.

The first of these languages was the General Markup Language (GML), created in the early 1970s by IBM researchers working on document management issues for lawyers. GML attracted the attention of the American National Standards Institute (ANSI), which was investigating how documents could be

Bonus CD software
Altova XMLSPY 5 Home Edition : full version.
ON THIS MONTH'S APC COVER CD

''We see XML as a strategy to achieve the longevity of data, allowing easy re-use and ... compatibility''

exchanged electronically. In 1985 ANSI's work was refined by the International Organisation for Standardisation (ISO) to become the Standard Generalised Markup Language.

SGML came to be adored by a small group of users who were faced with the challenge of consistently formatting literally millions of documents (not uncommon in government departments, large global corporations and scientific and military circles). The language was designed to be machine-readable and was consumed by applications performing tasks such as tracking the planet's millions of shipping containers.

But SGML's complexity was excessive for Tim Berners-Lee and his CERN colleagues, who used SGML's content-tagging concepts to create Hypertext Markup Language (HTML) as a means of serving documents over a network.

HTML remains an excellent language for describing pages and letting your eyeballs consume ASCII characters and images, but a limited syntax means it can't do much more than display information.

To understand why, consider the following snippets of HTML:

```
<html>
<head>
<title>APC address</title>
</head>
<body>
<p>Title: APC</p>
<p>Phone: 02 9288 9111</p>
<p>Web: apcmag.com</p>
<p>Address: Level 9, 175 Castlereagh Street, Sydney NSW 2000 </p>
</body>
</html>
```

This displays the name and contact details for *APC* in a Web browser. But while the code could be changed to alter the appearance of the page, no amount of work would make it possible for a browser or any other application to understand the data it contains — a crucial task if, for example, you wanted to create a list of magazine names and contact details without performing any actual data entry.

The best you could come up with would be a very sophisticated program to sift through the HTML and find the relevant details by pattern-matching and checking their proximity to related data.

XML removes this problem by describing the type of data a document contains. And by virtue of being extensible, anyone can create new tags to meet their own needs.

Born in early 1998, XML was primarily intended to make documents more machine-readable. It also hinted at a way to stop the proliferation of non-standard HTML tags, which in the late 1990s were being added by Microsoft and Netscape almost as they saw fit (without the blessing of any standards organisation). An extensible language erased that problem by giving anyone a blank page to create tags on.

Here's how the same contact information for *APC* appears when represented by XML:

```
<magazine>
<magtitle>APC</magtitle>
<phone>02 9288 9111</phone>
<web>apcmag.com</web>
        <magaddress>
        <level>9</level>
        <number>175</number>
        <street>Castlereagh</street>
        <streettype>Street</streettype>
        <city>Sydney</city>
        <state>NSW</state>
        <postcode>2000</postcode>
        </magaddress>
</magazine>
```

This XML document contains the same data as the HTML version, but special tags known as "elements" describe the content in ways that make it possible for machines to read and understand. This is XML's most critical advantage.

MAKING SENSE OF SCHEMAS

Anyone can create XML tags to describe anything, even using counter-intuitive tag names like the <magtitle> and <magaddress> elements in the above XML sample. This of course opens up problems with standardisation: would every magazine publish its contact details using identical terms like <magtitle> or <magaddress>? Probably not, which is why XML uses Document Type Definitions (DTDs) — separate documents listing the vocabulary of elements in an XML document, to ensure that everyone's custom elements can be correctly interpreted.

So that it's handled correctly, applications also need a way to recognise the data itself. For example, the <phone> element could contain a mix of numbers and characters. The fix for this is a schema that imposes rules on user-defined XML elements. In this case, a schema could define the <phone> tag as containing 10 digits (it could also allow for brackets around an STD area code, or the + symbol to indicate an international dialling code).

Schemas and DTDs can be included inline with XML or located on the Internet and then called from within an XML document by linking to a local store or a URL.

XML schemas are not easily and quickly created. And because XML is about sharing data, hundreds of special interest groups have devised standard XML schemas to address the particular needs of their industry or community.

One such schema is Extensible Business Reporting Language (XBRL), created by financial institutions to standardise company

reports to stock exchanges and investors. Weather Observation Markup Format automates the collection of weather reports. There are schemas for media, real estate, travel, even sharing recipes (Recipe Markup Language), not to mention the gruesome-sounding GIML (Gastro Intestinal Markup Language), one of several healthcare-related schemas. At the time of writing there were 219 industry schemas published at the XML.org portal (**www.xml.org/xml/registry.jsp**).

Another important pair of XML standards are the Extensible Stylesheet Language (XSL) and Extensible Stylesheet Language Transformations (XSLT). The former is XML's version of Cascading Style Sheets, while XSLT documents define how XML can be translated, either into different schemas or into proprietary data formats. FileMaker, for example, uses XSLT to render XML readable by the FileMaker database.

Beyond XSL and XSLT lie many other tools and standards. XPath is a hierarchy navigation tool; XQuery is XML's equivalent of SQL; XLink is a linking language for XML; while XKMS is a public key management system. These and many more are a sign of XML's rapid evolution and the many uses for the format.

XML IN THE REAL WORLD

XML has many uses, the most basic being as metadata — embedding information in files that can then be accessed by applications. Digital cameras apply metadata to snapshots, used by Windows XP and Mac OS X for sorting and shuffling images. Adobe's own Extensible Metadata Platform (XMP) allows XML to be embedded in Photoshop, Illustrator, Acrobat and InDesign files, creating what Adobe calls "smart assets" for content or document management applications.

Metatags may also be applied to documents created using applications like Word or Excel, describing and exposing their content to other users and intranet search engines.

Microsoft's muddle?

Microsoft's backing of XML, most prominently in the forthcoming release of Office 2003 and the InfoPath XML application, immediately boosts the profile of the language and strengthens hopes for its future.

But it also raises issues of compatibility — Redmond is not known for gracefully implementing open standards — while the company's own implementation of XML in only some of the Office 2003 bundles is causing concern.

Only the higher-end Professional and Professional Enterprise editions of Office 2003 will allow users to save documents into any XML schema, typically those endorsed by their company and based on industry standards.

Mainstream versions such as Office 2003 Basic, Standard and Small Business will force users to save documents in Microsoft's own XML schemas, called WordML or SpreadsheetML, which are intended to be XML replications of the DOC and XLS file formats. Microsoft admits that while the content of WordML and SpreadsheetML documents should be readable by most applications, the schemas will not parse well enough for formatting information to survive in some circumstances.

Woody Leonhard, an industry expert on Microsoft and publisher of the highly regarded "Woody's Watch" newsletters, believes these features need to be taken with a pinch of salt, especially as Microsoft's implementation of XML in Office 2003 remains in a state of flux.

"We've heard promises from the folks in Redmond — specifically that they're re-designing the default WordML and SpreadsheetML schemas to make them easier for antivirus software to understand.

"But as with all major implementations by Microsoft, it's important not to get carried away with the hype and promises," Leonhard cautions. "Instead, wait and see what happens in the real world."

Leonhard also questions exactly what XML adds to Office. "For many versions of Office you've been able to save as Text, using a Form, or write a simple macro. These can all produce much simpler files with far wider usability."

Office's new application, InfoPath, perhaps explains the direction Microsoft is taking. Being bundled into the top-end Office 2003 Professional Enterprise Edition, InfoPath is a tool for developing and publishing XML-powered forms using Office's applications as clients. InfoPath will be able to use any schema, giving users of the lower-end versions of Office another path to creating XML without needing to confront XML's complexity.

With or without InfoPath, however, the sheer numbers of Office users means WordML and SpreadsheetML will proliferate, unless businesses are willing to pony-up for the costlier versions of Office to access XML functionality beyond retaining document formatting.

Whether or not this will pollute XML in Microsoft's image remains to be seen.



InfoPath 2003: *a tool for developing and publishing XML-powered forms, it will be bundled with Office 2003 Professional Enterprise Edition.*

XML files are also useful when shared between businesses. For example, consider an electronic procurement transaction. Most procurement applications use proprietary data formats, meaning buyers output a purchase order in the format required by the application. Because most businesses deal with several suppliers, they end up juggling several proprietary file formats. But in an XML-enabled procurement system, a buyer need only know which schema is required and can then tailor an XML purchase order for that transaction.

One of many Australian organisations to adopt XML is the State Library of South Australia. This organisation chose it as the format for its catalogues. "We see XML as a strategy to achieve the longevity of data, allowing easy re-use and eliminating future data migrations and incompatibilities," says Lesley Sharp, the library's ICT project manager.

"We aim to achieve the storage of metadata and associated content generated by our staff in native XML, so that it can be re-purposed as required for other uses such as exhibitions, handheld devices and so on."

The library will put XML to work using a content management system and a native XML database. Sharp reports that the library's investment in XML technologies hasn't been large. "We have purchased new software and hardware, but we were going to do that anyway. Ensuring the solutions were forward-looking was part of the procurement strategy.

"We're enjoying going down the XML path, but we've got a long way to go. We've only just put the various pieces of the equation together," she says. "Now we're moving into the phase where we can start to deliver services from these pieces."

Australia's superannuation industry provides another example of standardising on XML to describe common documents. Australia has hundreds of superannuation funds, all free to choose their IT infrastructures. The result: very few standards. Because most funds format data differently, this becomes an issue every time an account holder rolls over his/her super from one fund to another.

This incompatibility creates weeks of manual work, chewing up a large slice of a super fund's administration fees. The industry has created a body called SuperEC to design a standard XML-based format for superannuation data and publish an XML schema that describes the most common transactions between super funds, employers and other bodies.

WORK IN PROGRESS

Some parts of the XML puzzle are yet to be finalised. For instance, as standards for security and "orchestration" (applying business logic so several XML Web services can be joined into a single business process).

There are also implementation issues. Because different operating systems have different ways of doing the same things, several vendors have devised subtly different definitions of how XML Web services behave. Vendors are generally cooperating around the standards needed to make sure Web services are truly multi-platform, and their efforts have already created Web Services Description Language (WSDL), intended to offer a universally agreed definition of an XML Web Service and remove platform-specific kinks.

There's also an over-arching concern that the rush to develop XML standards will result in splits that hinder the interoperability XML is designed to deliver.

Gartner analyst Rita Knox believes the onslaught of new XML standards may confuse business. "Without some revolutionary change to the way XML-defined standards are developed, the maze of standards will continue to proliferate and there will be no way to discover redundancies or identify conflicts and reconcile them," she says.

"At the least, the proliferation of standards will result in millions of dollars of lost effort. At worst, it will corrupt data and compromise business-critical transactions and operations because different parts of the same company will process conflicting XML messages without knowing it."

Despite the work still to be done, the good news is that XML is already very useful and quite practical, and the momentum behind the format is substantial. No one is fundamentally opposed to XML — the entire industry wants to use it. And that's the strongest reason to feel good about the direction in which XML is heading. EDITE



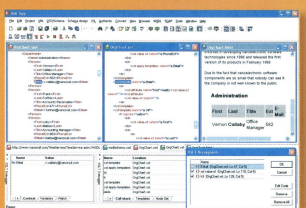
XML tools

The most basic XML tools are editors such as Authentic (**www.altova.com**), Epic Text (**www.arbortext.com**), Xerlin (**www.xerlin.org**) and Xeena (**www.alphaworks.ibm.com**). These offer a WYSISWYG environment for creating XML documents.

Application development tools are the next step. The best of these allow the creation of DTDs, schemas and transformations — XMLSPY (**www.xmlspy.com**), TurboXML (**www.tibco.com**) and XMetal (**www.corel.com**) are all worth a close look. You can find a full working version of the latest release of XMLSPY Home Edition on this month's cover CD set, plus a Workshop about creating a simple XML service in this issue.

Beyond these applications lie integrated development environments like Microsoft's Visual Studio .NET and IBM's WebSphere Studio for crafting full-blown applications using XML Web Services.

At the back end are databases, with many arguing against storing XML in relational databases and favouring native XML databases. These include Ipedo (**www.ipedo.com**), Neocore (**www.neocore.com**) and Tamino (**www.softwareag.com**).



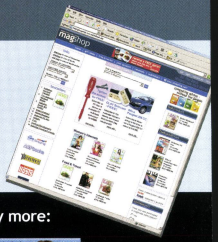
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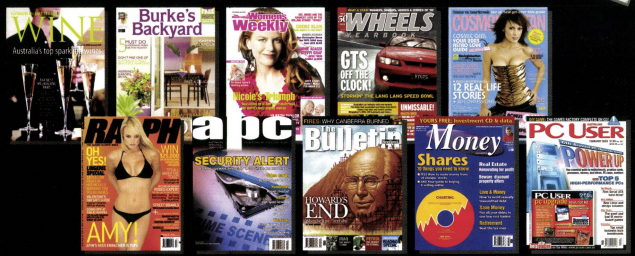
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Versus



Tux "The Penguin" LINUX

The ultimate OS showdown!

By *Matt Overington, Paul Robinson* and *Mike MacCana*

Ford versus Holden. Wallabies versus All Blacks. Foreman versus Ali. Nothing incites passion and debate like truly great rivalries.

The IT community has had its fair share of tiffs over the years, from platform wars between Wintel and Apple, to CPU battles that saw AMD claw back against Intel, and the ongoing leapfrogging between ATI and nVidia over GPU speeds. But these are backyard scuffles compared to the passion generated by the titanic showdown between Windows and Linux.

Zealots have taken to opposite corners of the ring and the spotlights are on. Linux has long been regarded as a featherweight contender beside Redmond's colossus, as a lack of polish and a distinctly user-unfriendly interface kept it several paces behind the competition. Even though the current strain of Windows development commenced in 1989, and Linux benefits from more than three decades of Unix development, Microsoft managed to grab massive market share in the 1990s with a run of acceptable desktop operating systems from Windows 3.0 to Windows 9x.

The latest wave of Linux distributions, including Xandros, Lindows, Mandrake, Red Hat, Debian and SuSE, has heralded the arrival of a Linux that's ready to take on Redmond. With polished installers, automounting file systems, refined GUIs and a suite of productivity applications, the ante has been upped to the point where Microsoft is finally starting to perceive a serious threat from Linux.

A leaked document from Microsoft has even suggested that if sales staff run the risk of losing a contract to Linux, they have a green light to discount Windows to avoid dropping big-ticket customers.

The question on many geeks' lips is: has Linux has matured enough to take market share from Redmond?

To answer that, we've assembled three geeks with massive experience across both platforms to referee this bout, as Windows and Linux duke it out over five rounds. To determine desktop superiority, they're scoring the fight based on installation, Net connectivity, development, productivity, and entertainment.

Now wait for the bell, and let's have a good clean fight.

Round 1: INSTALLATION

Acquisition

One of the main points favouring Windows is its popularity. Microsoft's OS is ubiquitous, and although it costs a few hundred dollars (up to a few thousand), it can be purchased at countless shops and computer retailers worldwide. It has the benefit of a massive user base, thanks in part to the fact that most new PCs come pre-installed with Windows. Most computer users have experience with Windows, and it's not hard to find someone to help if things go wrong.

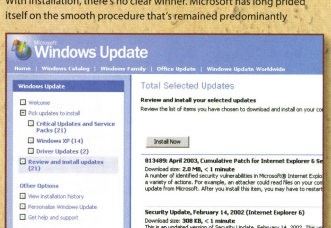
Of the major OEMs, only Dell offers its customers an option to install Linux instead of Windows, at the same time allowing them to avoid the associated licensing cost. Windows is everywhere, but it's not cheap.

That said, Linux chalks up a few points for the open source movement thanks to its availability. You can download it from countless mirror sites and many distributions are free.

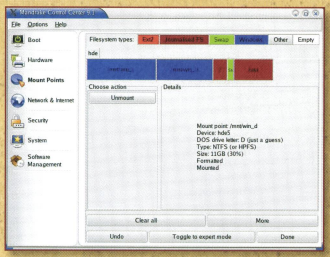
If you're going to download a distro, you'll need a substantial data pipe, as they range in size from a couple of hundred megabytes to several gigs, which makes this option less-than-appealing for dialup Internet account holders. Often a nominal charge is applied to burnt copies of Linux, but this is usually just to cover the cost of media and postage. Granted, you generally have to pay for support, but countless Linux user groups exist that are more than willing to provide free troubleshooting tips.

Initial loading

With installation, there's no clear winner. Microsoft has long prided itself on the smooth procedure that's remained predominantly



Up to date: *both Windows and Linux feature auto-updating tools for patch downloads.*



Dual duel: *because Linux has traditionally played second fiddle to Windows, it comes with a solid set of disk tools for dual-booting.*

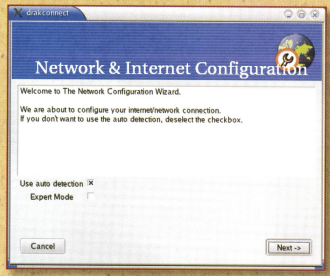
unchanged since Windows 95. The Windows installers are solid and reliable for the most part, and it's rare to see one crash.

Linux has made up a lot of ground in recent years by simplifying the process of installation. Lindows, Xandros and even the current versions of Red Hat and Mandrake feature simple, effective installers that cater to both the beginner and professional, but often require minor tweaking after launching the OS.

The time required and ease of installation varies greatly across Linux distributions — some, like Debian, are tough, but Lindows and Xandros are pictures of elegance. Lindows has one of the best installers ever conceived: the user can play Solitaire for 20 minutes while the packages are copied to the hard disk.

Windows takes approximately one hour to install, which is about the same amount of time required to dump most Linux distros to a hard disk. During this time, Windows copies up to 1.5GB of data to your hard disk, depending on which version and options have been selected. This is in contrast to more than 3GB that can be transferred during a full Linux installation, making the Linux installers more efficient (albeit not so user-friendly).

After installation, tweaking is always going to be needed. Windows comes out ahead in terms of accuracy of hardware probes and autodetection, as a config file tweak is often required to get X Windows or a printer running comfortably under Linux. Windows also comes up trumps in supplying driver patches and updates, as Linux drivers are traditionally slow to be released. This is largely due to the partnerships between Microsoft and hardware vendors that results in solid, integrated driver development going hand-in-hand with Windows development.



Novice networking: *Mandrake's networking wizards are on a par with those provided under Windows.*

Thankfully, as so many mission-critical business applications have been moved to Linux, security patches come out at about the same time.

One area of installation where Linux is head and shoulders above Windows is in its set of included tools. Modern Linux distros feature superior partitioning tools, thanks largely to the fact that Linux has traditionally played second fiddle to Windows. Uptake has been dependent on the ability to run both Windows and Linux on the same machine, and most people would like to be able to sit down and test Linux before committing to it.

Working into Linux the ability to co-exist with Windows has always been a focus for the developers. Windows was the de facto standard and enjoyed a massive user base, while Linux was in its infancy. As such, it has been less important for Windows to be able to read Linux partitions, but vital for Linux to read and write Windows ones.

The disk tool supplied with Mandrake 9.1 features the same functionality as many commercial applications under Windows. It can move partitions, create Linux and Windows partitions, and even resize NTFS ones, so it's not necessary to delete Windows to squeeze Linux onto a machine. By contrast, Windows installers are capable only of reformatting or installing over a previous version.

Hardware support

While Linux distros are catching up with Windows they can't match the Redmond colossus for hardware support. It still takes a geek to get a digital camera or handheld successfully talking to a Linux box. Why? Because hardly any TV tuners, printers, scanners or digital devices ship with Linux drivers.

The hardware vendors can't be blamed for this situation. It takes time and energy to develop drivers, and the onus is on the hardware manufacturers to ensure that they support the most popular platforms before focusing on less popular ones.

That said, in recent years several major hardware vendors, like nVidia, have focused on developing drivers in-house, giving a leg-up to Linux as a graphics platform. Kernel 2.4 has FireWire and USB support, and the current releases from Red Hat and Mandrake have added an automount feature for DiskOnKey devices like USB memory keys, but Linux still has a long way to go before it can match the seamless hardware installation process pioneered by Windows.

Adding software

When it comes to painlessly adding new programs to a working operating system, Linux is also still playing catch up. The biggest problem with installing software to a Linux box is that there aren't any standards for the way installation programs should behave. Under Windows, the Installshield program takes care of this. Users can rely on double-clicking a downloaded setup file and having it unpack to a temporary folder, copy to a location on the hard disk, make registry adjustments, and place a shortcut icon on the desktop or start menu.

Under Linux, users usually launch a shell, manually unpack a tarball and then run an installation script from where it was decompressed. Occasionally, a developer will call on users to compile the program from a collection of source files and libraries. Experienced command line jockeys won't have a problem with this, but most mums and dads will — and do.

Apt, dselect and the Red Hat Package Management System (RPM) have gone a fair way towards taking the pain out of installing programs under Linux, but it's still not as easy as most installations under Windows. Chalk another one up for team Redmond.

This round sees Linux earn points for being inexpensive and downloadable. Windows rallied and landed blows for ubiquity, a solid installer, hardware support and ease of adding applications.

Round 2: NET CONNECTIVITY

Connect here

Before any connection to the Internet can be made to download operating system updates or new software, a functional network connection has to be set up. The first battle is fought over hardware drivers, and Windows wins out easily here.

There is a massive range of networking hardware with drivers available for the Windows platform, especially in the consumer space. Linux has traditionally had trouble with soft modems specifically designed under Windows to leech CPU cycles. The same once was said for a range of NICs, but Linux support for most common chips is now stable and functional. In the higher-end server space, the playing field becomes level and Linux competes head-to-head in terms of drivers.

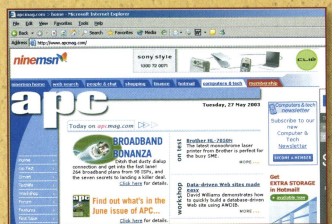
When configuring ADSL and cable modems, the field is pretty level too, as many are configured via a browser interface that remains OS-independent. Unfortunately, Telstra's heartbeat makes life a little more difficult for the Linux corner. The heartbeat is a regular message sent from Telstra servers to a PC to make sure a line is still connected. Telstra supports only the Windows and Macintosh platforms, and although a tool called BPALogin is available for Linux to handle the heartbeat, it's a hassle to have to search for it and install it manually.

Windows includes wizards to help you connect to the Internet, each one useful for guiding a novice through the relatively complex task of configuring a modem or NIC. Most Linux distros, like Mandrake and Red Hat, include similar wizards, but they assume the user knows more about what they are connecting to. Most experienced users will know if their ISP uses POP3, but newbies can suffer from acronym overload.

Under Windows, another wizard helps share an Internet connection between several machines. Although it's pretty basic and internal Windows networks are limited to an IP range of 192.168.0.x, it works well. It's a little more fiddly to edit configuration files under Linux to share a connection with other machines, but it's not impossible. And Linux doesn't suffer IP limitations.

Once a connection is established, there's not much difference between the systems. Both KDE and Gnome feature connection icons in the status bar, like the one found under Windows. Browser selection is often a moot point as both Windows and Linux have one already and many don't upgrade. Netscape, Mozilla, and Opera work well for both Windows and Linux, but the de facto standard has become Internet Explorer, available only for Windows and Mac.

Opera is arguably the most polished browser for Linux and boasts extremely fast loading times, a tiny footprint and a mail component added in version 7.11. It can even pretend to be Internet Explorer and fake IE compatibility. Both platforms feature support for various forms of plug-ins, including QuickTime, RealPlayer, Java Virtual



Safe choice: *Internet Explorer is the world's most popular Web browser.*

Machines and DivX. Under Windows, these plug-ins are generally added by clicking on a link in the browser.

The download and installation is then handled automatically. Linux configuration is typically trickier, as most need to be downloaded and manually patched-in.

Both platforms draw level when it comes to transferring files. There are a number of powerful FTP applications for Linux, just as there are for Windows. For example, CuteFTP and gFTP provide almost the same functionality. Windows wins for download managers, though, while the built-in shell-level tools for Linux are superior.

The Telnet, SSH and FTP clients provided with Linux are stable and scriptable, whereas the shell-level tools supplied with Windows are basic. Windows has easier built-in file sharing, especially across a Windows-only network, but you can set up your Linux box to share the files via FTP or HTTP, which isn't possible with a boxed copy of Windows XP.

Email

Basic email applications are bundled with both. In Windows, users are given Outlook Express, while Ximian Evolution and Kmail are bundled with most Linux distros. Ximian Evolution is a good match for Outlook's mail features and can be configured to connect to a server to store email and contact lists remotely, just like Microsoft Exchange.

Redmond — traditionally innovative in this area — wins this tussle despite much criticism that the integration of VB scripting into Outlook has aided the spread of worms and viruses across the Net.

Virus contamination should be one of the biggest concerns for anyone connecting to the Internet or trading files. Viruses have been part and parcel of Microsoft operating systems since the late 1980s, and Windows has accelerated the spread of malicious programs. Until recently, viruses have been less of a concern under Linux because

each program runs at user level, so system-wide changes could be made only if a virus had root privileges. That said, a virus will infect any computer if it's poorly configured, and we can expect to see more as Linux becomes increasingly popular. For now, Linux wins hands down in this area.

With instant messaging, the stand-off continues. The Windows integration of Instant Messenger into the OS is a handy feature. It provides one-click access to email and contacts, but this also constitutes a substantial security hole not found in Linux. Trillian and other cross-format chatters can be found for Linux, and although they may not look as pretty as those for Windows, functionality and stability are maintained.

Firewalls

Windows XP raised the bar in ease of lockdown with its built-in firewall enabled by simply checking a box. Unfortunately, this provides only basic protection and is easily circumvented by countless hacking tools available via free download. On the other hand, Linux has had a firewall built in since day one. It has matured well and is one of the most compelling reasons to favour Linux as a gateway server over Windows.

Myriad firewall applications exist for both Windows and Linux, with the strongest, Zone Alarm and Kerio Personal Firewall, available for both. In terms of stability, Linux rules the roost. We've seen Linux boxes that have been up for years without ever needing a reboot, which also lends the free OS to running as a gateway or router.

Another point to Linux.

Linux wins this round because of its strong file sharing, firewalls and security offerings, even though Microsoft IE owns the browser space.



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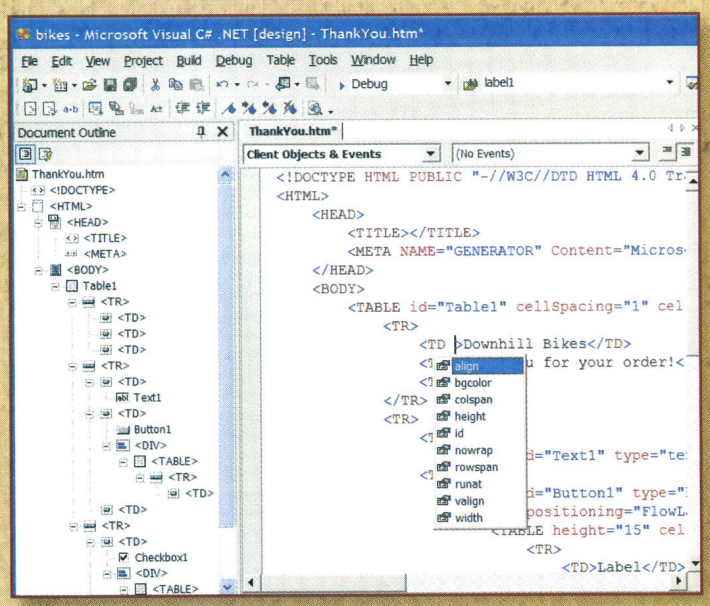
Round 3: DEVELOPMENT

Applications

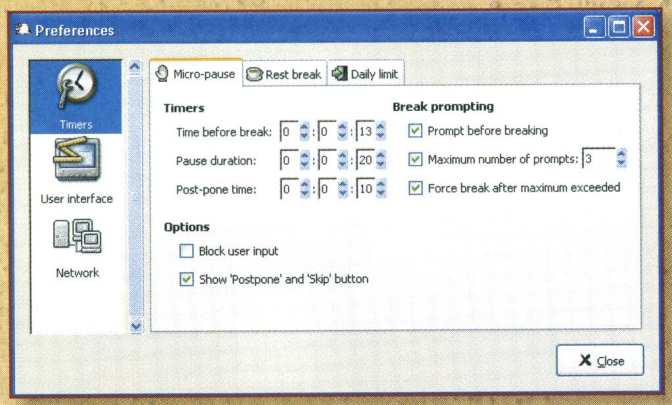
Once upon a time, all Linux users were developers — hence software development tools on Linux tend to be quite mature. Modern Linux distributions still ship with a mature and rich variety of compilers, virtual machines, interpreters, debuggers and code-auditing tools for almost every language out there, including C, C++, Java, Python, Perl and some more exotic options.

More recently, some impressive and competitively priced IDEs have become available on the platform, including QT Designer, Kylix, Zend, KDevelop and Glade. Since the closed source apps have to compete with both open source and Microsoft's Windows tools, they tend to be competitively priced. Furthermore, the companies that provide them have a reputation for excellent, personalised support, even putting customers in direct contact with their own developers to solve problems.

There are two main issues here. The Linux IDEs don't have the wide availability of skills, third-party support, training or other resources of Microsoft's Visual Studio (with more than 10 million developers). There's also a variety of competing technologies to base graphical Linux applications on, and the choice of technology will have a large impact on the final product. Differences between Linux toolkits are more pronounced than in Windows, where the applications created with Microsoft's MFC toolkit are indistinguishable from Borland VCL-based apps. GTK and QT



Support of millions: *while there's a variety of Linux IDEs, none has a user-base as large as Visual Studio.*



Dual flexibility: *the main Linux GUI toolkits provide native look and feel across both platforms.*

maintain different theming engines, so applications written in one toolkit won't appear consistent with those written in another (distributions like Red Hat and Mandrake ship with identical themes for each by default, but changes to toolkit themes aren't reflected in the other).

At least Linux provides a solid platform for creating cross-platform apps. Trolltech's QT toolkit (well known as the basis of KDE, but also used by companies like Opera and Adobe) provides native look and feel across Linux, Windows and Mac OS X. However, you'll need to pay licensing costs for the Windows and OS X versions if you're making closed source software.

QT's younger competitor, GTK, also works on Windows and has no licensing costs. The Win32 GTK version used to be the poor cousin of the Unix version — applications wouldn't look native, using a different set of fonts and colors from other Windows apps. This has been addressed with the recent release of GTK-Wimp, which provides a native look and feel for GTK Win32 apps.

Windows is less of a developer's OS and ships with no out-of-the-box development tool-chain. However, there are a variety of compelling, albeit expensive options, and they're highly polished. Windows development has always been task-oriented and geared towards end users, providing a quick means to stitch together simple glue apps with rich GUI features.

Visual Studio has millions of developers, and Borland's products also have a sizable audience, with thousands of local case studies, widely available training and lots of easy-to-follow online resources. Linux will get there. Both Microsoft's and Borland's products have created cottage industries around them — it's even possible to create native Linux apps from Visual Studio using Visual Mainwin, an application from MS Partner Mainsoft that provides a Unix version of the Win32 APIs, such as MFC.

Overall, this is a pretty tough one to judge — it depends largely on

❧ ***Limited kingdom:*** *while Linux has a variety of top code-based Web design tools, Dreamweaver is available only for Windows and Mac.*

your existing knowledge and preferences. We'll call it even.

Of course, there's another important addition to the Linux tool-chain: headers for thousands of open source applications. While developers for either platform can write their own app from scratch, they have another choice: simply modify an existing open source project.

Since most software is developed in-house, taking advantage of open source and using someone else's work (and releasing your changes if you choose to distribute that app) may provide a faster solution to the problem.

There are more open source Linux apps than Win32 ones, a clear win for Linux, but it's an option worth considering on Windows too.

Web services

Microsoft's .NET strategy encompasses a range of technologies, some more useful than others. One of the biggest parts of this puzzle is Web services — remote applications that can be called just as easily as functions in a local library.

This has a number of advantages, encouraging code reuse and the creation of modular applications, as well as providing related organisations to talk to each others' software in a standardised, programmatic manner.

The technologies used are XML for the data, HTTP as the transport (with SSL where appropriate), WSDL to describe the capabilities a Web service provides, UDDI to discover available Web services that provide a particular capability, and SOAP to perform remote operation (in a more direct and much simpler way than traditional methods such as Corba and DCE).

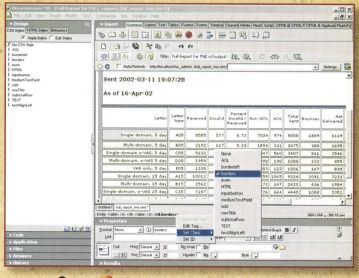
Microsoft has been working and pushing all of these technologies, sitting on the standards boards that define them, and implementing them within the .NET framework and Visual Studio .NET. Borland's Win32 development applications also provide a competitive foil which implements these technologies and is less tied to Microsoft products and partner Web services.

Simply put, more Web services development and tools are available for Windows.

But Linux also has a variety of serious Web services implementations, primarily from Borland and Sun ONE. These standards allow applications to access Web services running on remote systems, regardless of the platforms in use. Ximian is also in the process of creating a full .NET-compatible solution, including a C# compiler.

Mono is very useful for creating network services, multimedia applications and command line tools, but it lacks an implementation of Windows forms, so it's not yet an appropriate solution for porting Windows desktop applications.

Linux is certainly improving in this area, but all the efforts driving this collection of standards forward seem to be happening on Win32 platforms. In short, we'll award this one to Windows.



Scripts

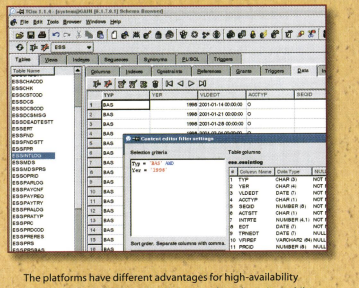
The ability to automate repetitive tasks through scripting saves time for network administrators who have better things to do, and helps the budgets of companies that need to solve a problem without the expense of a dedicated solution.

Scripting is part of the culture of Unix network administration, and the operating system reflects that, with almost every Linux application making its functionality available on the command line. This means you can do a lot more through Linux command scripting than the Windows equivalent — in fact, it's possible to create some truly astounding applications. For example: perform a remote, encrypted backup that swaps the tape when done and sends an SMS message to your mobile phone if anything goes wrong; or create an app that builds OpenOffice reports that document the configuration of your servers.

Of course, higher level OO languages like Python and Perl are available — the former has a well-deserved reputation for providing the glue between disparate applications and systems and is widely used on both Unix and Windows platforms throughout Australian businesses.

While scripting isn't seen as a core task of Windows network administrators, it's more capable than many Unix administrators would believe. Windows scripting focuses on VBScript and COM rather than command scripting, and the CLR of .NET means that you can program against or debug any other .NET application regardless of the language it's written in.

In short, there are advantages to both sides. Command scripting is easier to learn for existing Linux admins than VBScript is for their Windows equivalents and more Linux applications expose their functionality by these means than Win32 apps via DCOM. However, the DCOM approach provides a more structured system, relying less on the formatting of text to do its job (and hence providing a more maintainable solution). Windows also has a very complete Perl implementation from Activestate. For this contest, we'll call it a draw, and anxiously await your emails.



Polished front-end: *the best SQL worksheet for Oracle is arguably Tora, which is rarely heard of in Linux circles.*

Web design

Dreamweaver MX, the king of graphically oriented Web development tools, runs on Windows and Mac only. Sure, Microsoft produces FrontPage, but Redmond's Web tool has been slow to support Web standards, builds large pages and integrates content with presentation, making pages difficult to maintain. The 2003 release fixed many of these issues but is more complex — eliminating the reason why many used the suite in the first place.

As for Linux, we have yet to find a compelling visual editor that can compete with Dreamweaver MX (but let us know if you find one).

If you prefer a pure code approach to your site creation, both platforms are pretty well matched. There are a number of options for Windows (HomeSite and NetObjects fusion) and Linux (Quanta, Kate, Bluefish).

So Redmond is going to win over the Web designers, but what about Web developers? The popular Linux Apache Web server supports PHP, Perl, JSP and Python Server Pages out of the box, with support for ASP (written in VBScript) available via Sun's proprietary Chillisoft product (there's also an open source Perl ASP module available). IIS supports ASP out of the box, but all of the above are also available for the platform — particularly PHP, which has really improved its Win32 application in recent times.

Cold Fusion is available for both platforms. Apache needs less updates than IIS, and almost any Linux distribution tool is superior to the Windows Update and the now unmaintained HFNetChk, both of which have recently been the target of much scorn. Linux is cheap, reliable and widely used (PHP is more popular than ASP, according to Netcraft). Another point to Linux.

Databases

A short while ago serious databases were synonymous with proprietary Unix systems. Neither Windows nor Linux were traditionally DBMS platforms. But, over time, both have emerged as capable database platforms, providing solid performance on inexpensive commodity hardware. Most well-known database engines are available on both platforms, including Oracle, DB2, Sybase, Interbase and more. Microsoft's SQL server (derived from Sybase) is available on Windows server platforms only. There are a few open source DBMSes here, including PostgreSQL, MySQL and SAP DB, all available on both platforms.

Windows dominates very high-end TPC benchmarks, but should face strong competition from the next version of the Linux kernel, which will likely boost big-scale database performance. Database vendors, such as Oracle, tired of seeing Microsoft tune its OS to its DBMS and leverage MS SQL Server off other already successful technologies, are helping Linux to support much larger amounts of memory, more threads and faster networking, as well as enhancing the OSes storage capabilities.

The platforms have different advantages for high-availability scenarios. Windows performs slightly better when clustering, while Linux runs on more high-end architectures than the Intel-bound platform from Redmond.

Windows is also host to client front-end tools such as Access and Filemaker Pro, as well as higher end tuning/querying tools such as SQL Navigator. Tora is a polished open source database front-end, rarely heard of in Linux circles but much-loved by fans, and it deserves a look on both platforms.

An even match here. Linux provides a solid platform and is the primary development platform for the open source DBMSes. Windows has SQL Server and massive scalability. The clear winner will be determined by your own situation. Call it another draw.

In terms of built-in programming tools, Linux wins hands down, but Windows rules the roost for full-blown integrated development environments. Linux owns Web production while the sides are even with database management and implementation.

Round 4: PRODUCTIVITY

A day at the office

Productivity applications are a good measure of a platform's maturity. For a while, the success of Linux was focused on developing an operating system that could provide a cheaper alternative to running Windows in the corporate environment. Red Hat is a good example of a Linux distribution that's followed this path. It comes from the box with minimal multimedia and gaming support, but an extensive collection of productivity and office-based suites.

It's obvious that Windows has a clear advantage for light work. Star Office and OpenOffice.org are very polished productivity suites under Linux, but they still have a long way to go before they can match the seamless integration and consistent experience offered by Microsoft Office. Windows has the market for word processors and spreadsheets all sewn up.

Microsoft Office remains the standard by which others are judged, and although it can be forced to run under Linux, it's via a compatibility layer provided by the Crossover Office plug-in. This isn't an ideal solution because customers still have to buy both the Crossover plug-in and a copy of Office individually.

Corel's WordPerfect continues to be made available under both Windows and Linux, but development for IBM's Lotus SmartSuite is sticking to Windows, at least in the short-term.

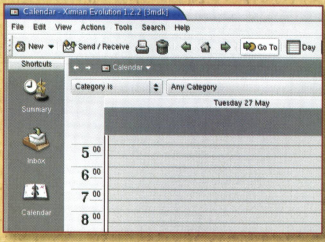
Accounting applications under Windows outnumber and outperform those for Linux. Although Quasar is extremely solid, it lacks the features of Quicken. The biggest advantage Linux users have is access to open source accounting applications that won't hurt the bottom line.

The downside of this is that support can be hard to come by, which is hardly appealing come tax time. Features like BAS statement generation — found in Windows' accounting applications — will better serve small businesses, although the lightweight nature of most Linux versions makes them ideal for household bookkeeping.

For desktop design and graphics, Windows stretches its lead over Linux in maturity of products offered. Photoshop remains the standard for graphics work across a variety of industries, but is limited to Windows and Mac. Bonus points for Windows here. Good image management and manipulation software packages abound for Windows, but under Linux they're relatively few and far between. The Gimp is awesome in terms of features and scores points because it's free, but it falls down in usability and polish compared to Paint Shop Pro and Adobe Photoshop.

Linux is rapidly catching up in the 3D modelling and raytracing area, and is especially strong in the realm of free tools for creating 3D animations. Windows remains ahead by a nose, but again, only because of platform maturity. Much has also been made of Linux's strength in post-production (*The Lord Of the Rings* film extensively used Linux machines during its editing phase).

While Windows is out in front in many aspects of productivity and serious computing, Linux offers a cost-effective platform for providing massive CPU grunt to film producers. It's relatively easy to cluster a heap of Linux computers together into a calculating powerhouse, and much cheaper than shipping in a few ultra-powerful server-class machines for the job.



Natural selection: *Evolution provides Linux users with access to a Microsoft Exchange server.*

Regarding CRM, the future's not looking bright for the Redmond corner. A recent survey of CIOs, conducted by Forrester Research, concluded that approximately one in four tech departments were, due to a perceived lowering of the bottom line, replacing Windows servers with Linux.

Given that, it may be a surprise that the challenge for groupware dominance is much more closely fought. SuSE Linux Groupware server is considered one of the most capable across the industry, and IBM has long focused its groupware development on the Linux platform. Just as Linux-based groupware solutions start to land a few blows, the Windows camp rallies with Exchange Server, arguably the most popular groupware solution across medium-to-enterprise businesses.

Microsoft Office sets the standard for productivity suites, but is only available for Windows and Mac. Redmond takes this one by a nose.

Round 5: ENTERTAINMENT

Game on!

Most game developers focus solely on the Windows platform, relegating Linux to the back of the line for purely economic reasons. There simply isn't a sufficient user base to support paying a developer to port a game to another OS. This was proven when Loki, a company devoted to porting Windows games to Linux, shut its doors in January 2002.

This was a terrible blow to the Linux gaming community as Loki's work highlighted the performance benefits of Linux. Many games such as Quake II and III ran faster on Linux than on an identical Windows system. With no-one concentrating on Linux development, those wanting to play the latest games must use compatibility layer software such as TransGaming's WineX 3.0 (**www.transgaming.com**).

Windows also has the DirectX API, providing an attractive common ground for game and hardware developers. Linux has a DirectX equivalent called the Simple Directmedia Layer (**www.libsdl.org**) that has been used in many Linux titles, such as the port of Civilization: Call To Power. Although not as popular as DirectX, it provides Linux developers with a stable, independent development platform.

Multimedia support

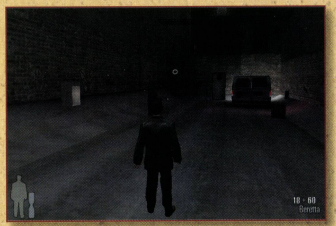
When it comes to native support for multimedia formats, Windows wins again. Linux has essentially the same multimedia support, but for most distros, users must specifically select multimedia support during the installation process. Windows Media Player takes the hard work out of installing and updating codecs — the only user input is to accept the installation of the codec. Linux users must search the Net for an appropriate update once their player complains, download a suitable version and then install it.

Some distros, such as Red Hat, don't even supply MP3 support out-of-the-box (after changes to the licensing of the MP3 codec). Because Xine also supports the MP3 codec, it too is cut from the Red Hat media suite, further crippling its native support.

Once the time has been taken to get things running with Linux, it scores points on price as its media players don't cost a cent for features such as DVD support. Windows users have to purchase specialised DVD playback software. There are plenty of media players to choose from, although Windows arguably has better supported players with a higher level of stability and efficiency.

However, Linux wins in the DVD department because its most popular DVD players, Xine and Mplayer, are easily found and downloaded from the Web. Windows users' main choices are programs such as PowerDVD, which must be purchased from a Web site. This isn't always a problem as many video card manufacturers bundle DVD playback software with their products. Keep in mind that Linux players have some playback issues, particularly with scaling.

But the beauty of an open source project is that it's continually evolving and problems such as this are usually rectified quickly.



Playful penguin: *It may take some fiddling to get them running, but Max shows that mainstream games aren't just for Windows.*

Both Linux and Windows have their fair share of DVD rippers for making backups of movies. Installation can be slightly more involved with the Linux programs, but once set up, they operate in essentially the same manner with similar functionality.

As for Encoders and Decoders, it's an even split between Linux and Windows. Both platforms offer the ability to work with almost any file format. For instance, DivX, Ogg Vorbis, MPEG and MP3 are supported by an absolute smorgasbord of freely available encoders and decoders, with similar performance from both OSes.

Overall, Windows integrates into the OS media and entertainment far better than Linux. Although many Linux fans are used to the way the Penguin operates, those trying it for the first time may struggle with multimedia.

Linux scored highly in its database implementation, but Windows clawed back valuable points with multimedia and entertainment. Linux support for video codecs and mainstream games is improving but there's still a lot to do.



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And the verdict . . .

We've counted the blows and tabulated the points through each round. It was a tight contest, but it ended as a technocal knockout by Windows. Microsoft's OS points win was as a result of its greater degree of "fit and finish" in all the areas you'd expect from a mainstream, mass-appeal operating system.

But this wasn't a knockout, dancing-around-the-ring victory. Linux landed its own share of clean punches in the installation and networking rounds to keep the battle more balanced than initially expected.

Linux is past the stage of being the unknown battler from the sticks, and Redmond knows it. Microsoft's PR machine has changed its tactics. They've toned down the dismissive tone which wrote Linux off as a mere try-hard, and started aggressively targeting customers who were considering a migration to the open-source OS.

One of the unquestionable strengths of Linux is that it's been created by developers, for developers. The supplied programming tools and scripting support are head and shoulders above what's available in the Windows camp, while Windows developers have focused on making life easy for the less tech-savvy through DirectX and inbuilt multimedia support.

However, Linux still has work to do. By excluding native MP3 and DVD support, it's effectively crippled for many people outside the bare bones business environment.

For Linux to claim a big chunk of the market from Windows, it has to filter down into homes and gain momentum in schools. That way, it will be adopted at a grassroots level by the next generation of computer engineers, programmers and end users.

If the Linux community can get that part of their program right, we could be seeing a very different result the next time its "great white hope" OS squares off against the Microsoft muscle machine. Even today, its clear that Windows and Linux are almost evenly matched. Each has strengths and weaknesses. And as any geek knows, it's not the OS that counts, it's how you use it.

	Linux	Windows	Winner
Installation	Excellent tools are provided with the installers, like NTFS resizing. Increased efficiency — although the installers take about the same time. More is transferred with Linux. Sometimes there are even games to play while you wait. Increased control over what you do or don't install. Freely downloadable (much cheaper).	Popularity — users are everywhere, and it's easy to find support. Smooth, albeit slower, install, and a superior post-install experience Installation of new programs is more elegant. Exceptionally strong in hardware support and driver availability	
Net connectivity	Wizards are available to help with configuring a network connection. Better Internet-sharing capabilities. Tighter integration with firewalls and a superior built-in firewall. Users have far less to worry about in terms of viruses and malicious code — at least in the short term.	Wizards are available to help with configuring a network connection. It's easier to connect a modem or other networking hardware because of more highly developed drivers and increased support. Browser support second to none.	
Development	Superior tools for coders — Perl, Python, C/C++ and so on. Apache is the most popular Web server in the world, outstripping IIS in terms of user base. The Linux open source community is stronger.	More polished integrated development environments. Leading the pack in terms of Web services with .NET integration. Site construction applications like Dreamweaver MX blow away what's available for Linux.	
Productivity	OpenOffice.Org is a full-featured (if a little buggy), free application. Linux performs well in the 3D modelling and movie-effects worlds, mainly thanks to applications providing outstanding performance at low cost.	Microsoft Office runs natively under Windows, scoring a massive hit — it's the de facto standard. Accounting applications like Quicken Cashbooks are more polished under Windows. Design applications like Adobe Photoshop help Windows to pull ahead with professional artists. Groupware applications like Microsoft Exchange are more developed for the Windows platform.	
Entertainment	Most media players (including DVD applications) are free.	DirectX is available, providing a standard platform for games developers and simplifying user support. Media Player supports many media formats and it can download and install codecs automatically over the Internet.	

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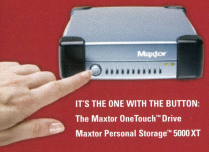
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WORKSHOP

Hands-on with hardware and software, plus bonus CD content

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Bonus CD software

Most Workshop articles are accompanied by bonus software loaded onto our cover CD set — just look for this icon. This is often software that is integral to the article. The selection ranges from full working versions and trial versions to shareware and freeware.

***APC* cannot provide tech support for these programs, but if you've got a problem with the CD itself, by all means holler our way (see pages 10-11 for how to contact our CD team).**

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Bonus CD software
Debian 3.0r1 two CD set, updated with the latest packages.

Up and running with Debian 3.0

Load this month's Debian CDs and cast aside those wannabe-Windows distros. *Paul Robinson* guides you through this no-frills favourite.

While the majority of Linux distributions wrap themselves in GUI shells, shovel software onto your hard drive and then take on a buttoned-down corporate (and dare we say, Microsoft-like) flavour, Debian remains true to the roots of Linux.

It's rock-solid fast, and almost entirely frills free. Most importantly, Debian puts you in complete control from the very first step. Unfortunately, that first step is where you're most likely to trip up, as Debian doesn't even bother with a graphical installation interface and the setup routine is far more involved than most distros.

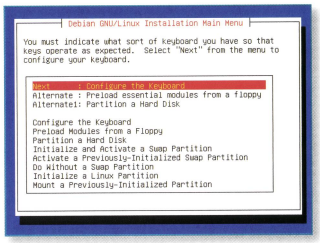
But with the right preparation and know-how, installing Debian becomes a rewarding experience in learning how the OS works. And the extra effort involved in setting it up is compensated by the ease of keeping the system up to date.

Forget about loading patches, updating your distro piece by piece, or starting from scratch every time — Debian's apt-get suite of programs keeps track of all installed programs and automatically checks for updated versions of everything, including the kernel.

Most PCs are Debian-friendly, providing they don't sport any exotic components. A simple workhorse desktop with a 500MHz CPU, 64MB of RAM and 1GB hard disk space (128MB of RAM with 1.5GB hard drive space if you want to run a GUI desktop like KDE or Gnome) can be turned into a rip-snorting Debian box. Even a 100MHz Pentium classic with 16MB of RAM can be hauled out of mothballs to comfortably run Debian in console mode.

Check the Linux Hardware Compatibility Guide (**www.tldp.org**) to ensure that all components on your PC are supported. Jot the details down on a notepad — this comes in handy when configuring Debian later on, particularly when setting up X Windows.

And don't forget to make a backup of any valuable files on the PC, just in case Murphy makes an unscheduled appearance halfway through the setup process. If you're going to run a dual-boot system and the hard disk already plays home to another OS such as Windows, you'll want to free up some space on the drive. To resize a partition without losing data, use a partitioning tool like Partition Commander (**www.v-com.com**) or Partition Magic (**www.powerquest.com**).



No frills: *Debian's text-based menu is a clear guide for running you through the installation process.*

Staying up-to-date

Debian makes it easy to add and remove packages (and package sources). Here are the four tools you need for keeping your distro fresh. Run these package commands as root, and point to the local package mirror at **http://ftp.au.debian.org**. The second "essentials" CD can also be used as a package source.

apt-setup Manages the list of package sources which apt should query for updates.

tasksel A simplified method of selecting packages based on selecting tasks the system must be able to run.

dselect The main tool for managing packages in Debian.

apt-get Install or upgrade packages.

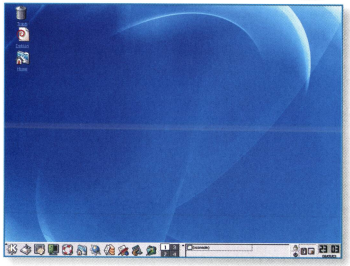
EPIC JOURNEY

Installing Debian isn't for the faint-hearted. You need to know what you're doing each step of the way — if you make a mistake you'll have to start from scratch. But this sometimes arduous journey is worth taking, because of the rewards at the end.

The main stages of the setup process are: preparing the hard drive for Linux; installing the base system; configuring the base system; choosing what tasks the Debian box will be used for; and choosing and installing additional packages.

Place the first of this month's Debian cover CDs into your CD-ROM drive and reboot. Depending on the system, the option to boot from a CD-ROM may be disabled or non-existent. If possible, configure the BIOS to boot from a CD. Otherwise create a bootable floppy disk by following the instructions in the manual (included on the first of the Debian CDs). Once the CD has booted you'll see the standard Linux setup boot prompt, which provides the opportunity to enter extra parameters when placating difficult hardware.

The next step is to partition the hard drive using cfdisk (assuming all the data on the drive is no longer required and can be wiped), which lists all available partitions and disks.



Fully furnished: *for a user-friendly desktop experience, Debian comes with KDE 3.*

For those unfamiliar with Linux, the OS doesn't refer to partitions or drives by the familiar alphabetical letters of DOS or Windows. Instead they're called hda, hdb and so on, to represent the first, second and subsequent IDE hard drives connected to the PC. Partitions are identified by a number on the end of the drive name — for example, hda1 is the first partition on the first drive.

Delete any existing partitions in cfdisk (move through the list with the up/down arrow keys, then use the left/right arrow keys to select the delete command from the menu at the bottom). Press Enter to remove the partition, and repeat this for any remaining partitions. Now the Linux partitions can be created on the empty drive.

As an absolute minimum Debian requires a root (/) partition and a swap drive. We recommend you create separate partitions for other major directories such as /boot, which needs about 50MB of space. Create the partitions by selecting New from the menu and entering the size of the partition. Once all the partitions are created, highlight the partition to be used for the swap space and select Type from the menu. There's a long list of supported file systems but for simplicity's sake, type 82 to select the Linux Swap file system. Use the Write menu command to commit the partition changes to the drive, then choose Quit to exit cfdisk.

Having created the Linux partitions, they must be *initialised*. This is Debian-speak for formatting the partitions, during which it can scan for bad blocks. First the Swap partition is initialised, then the root partition, and then any other partitions, prompting for a mount point for each.

Once the partitions have been initialised, the base system can be installed by skipping the PCMCIA option (unless you're loading Debian onto a laptop) and installing the kernel and driver modules. Debian will detect the CD in the drive and ask if it should use that source: select the CD option to continue.

Having installed the kernel and device modules, network configuration comes next. You can manually configure the network device or use a DHCP/BOOTP server to configure it automatically (if the query fails, the NIC can be manually set up).

Now it's on to the base system, which is a minimal set of packages required to boot the PC into Debian and provide the tools required to install other packages. The base system requires about 70MB of disk space, which gives a good indication of how minimal the Debian installation can be. Setup will prompt for the first CD again. As it's already inside the drive from installing the kernel and driver modules, just press Enter and sit back.

At the end of the base system install, the setup program prompts you to make the system bootable and to create a boot disk. It's common practice to choose the Master Boot Record (MBR) as the install location for the LILO boot loader.

And while you'll be tempted to skip the boot disk, we can't stress enough the importance of having one at the ready, just in case.

Reboot your PC and you're ready to configure the base install for your time zone, andenable MD5 and Shadow passwords (we suggest you say yes to both) as well as a password for the root account.

Once the root password has been set, a regular user should be added to the system. It's bad practice to use the root account on a day-to-day basis due to its ability to affect the entire system — as a regular user, the most damage that can be done is localised to that user's account.

You can also choose to set up a dialup Internet connection using PPP, although this can easily be done at a later stage.

ADDING PACKAGES

By this time the base system is up and running, but you won't be able to do much until you've loaded some packages. These contain all the services, applications and utilities, and other programs you'll need, and it's one of the appealing attributes of Debian — you start with the most basic distro possible and build it to your own requirements.

The primary method for retrieving Debian packages is using the nifty apt program. Unless your PC is connected to the Internet, the only source of packages will be the installation CDs. We've put the latest versions of the most popular packages on the second Debian

Putting the boot in

Shutting down and rebooting a Linux PC is different from other operating systems. Primarily, this is because it must be done from the command line.

While many window managers include shutdown or reboot entries in their menu systems, it's always good to know the syntax to shut down the machine.

This aptly named command is shutdown*, but it's the parameters added to the end that determine whether the system performs a shutdown or reboot, and when.*

shutdown -h now *turns the machine off immediately, using the* h *or* halt flag*. Changing this to -r will cause the system to reboot immediately. The time-to-shutdown flag is represented above as* now*, but can also be a specific time of day (in hh:mm format) or a number of minutes from now (in +m format). For example* shutdown -h +15 *would shut down the computer 15 minutes from when the command is run.*

cover CD, and there are more than 8,000 official packages (and even more not sanctioned by Debian's developers) online.

As there's only one official Debian CD, scan the first CD. Once the CD has been scanned, the apt-setup program will ask if there are any other package sources to add to the list. It's perfectly acceptable to have multiple package sources — there's a local package mirror at **ftp.au.debian.org**, or you can add extra package sources later by running apt-setup.

With the list of packages compiled, the Debian setup program now runs tasksel. This lets you select any number of tasks to be performed by the computer, such as running a news server, so that tasksel flags the appropriate packages for installation. We recommend the following tasks as a minimum : X Window System, Desktop Environment, Dialup System (for dialup Internet), Games, Debian Jr and Print Server if a printer's hooked up to the system.

Tasksel can be run at a later time by running the tasksel command as root.

Setup will now run dselect. This is a more advanced package selection tool which lists each and every package available. With thousands of packages to choose from, dselect should be run only when you have plenty of time to spare, so skip this section for now.

The packages chosen by tasksel will meet most basic needs, and dselect can always be run as root at a later date if a favourite application is missing (if you want to know more about using dselect, check out the online manual at **www.debian.org/doc/manuals/dselect-beginner/index.en.html**).

Packages selected with either tasksel or dselect are downloaded by apt-get and installed by dpkg: for example, apt-get install emacs will download and install or upgrade emacs. The full apt-get online manual can be found at **www.debian.org/doc/manuals/apt-howto/index.en.html**.

If a program needs more information, it will prompt for user feedback. Keep an eye on the output during the process for any installation errors; however, Debian will patiently wait for your input if a serious error occurs that prevents a package from being installed.

You will then be asked a series of questions regarding your X Windows setup. A list of available video drivers will be presented. Choose the appropriate driver using the hardware information you gathered before installing Debian (for example, a Riva TNT card will require the "nv" driver).

Setup will also ask whether to enable Frame-Buffer support. It's generally best to leave this disabled as many video cards will not function properly with it enabled.

A selection of available session managers will also be presented, giving the choice of GDM, XDM or KDM. As KDE is the default window manager, it's best to choose KDM. Another common question asked during package installation involves mail delivery: unless you have a special configuration (such as a central mail server), choose local delivery.

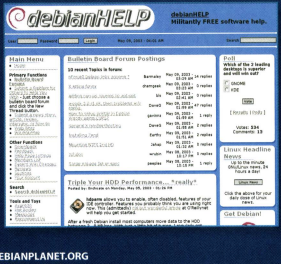
When you see the login prompt, the long install process is at an end. Log in as root with the appropriate password, and fire up X Windows using the startx command. Hopefully the GUI should load with the default configuration. If you're not that lucky and X Windows needs a bit of tweaking, run /usr/X11R6/bin/xf86configure as root. You'll be quizzed on issues such as monitor refresh rate, video card, video memory and what resolution and colour depth to use.

Once X has been finetuned and successfully started, the session manager chosen earlier will load for future system boots.

Online support

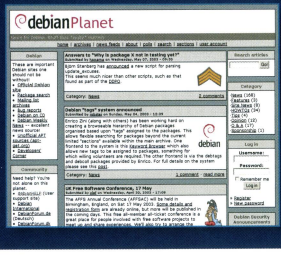
DEBIANHELP.ORG

This support site provides a meeting place for international Debian users both seeking and offering advice. You can expect an answer to your question within minutes or a few hours at the latest. It's all very friendly and helpful.



DEBIANPLANET.ORG

Run by users, for users, this is where you go to keep updated on all things Debian. There are plenty of tips and tricks as well as how-to guides on a variety of topics, plus links to plenty of other Debian sites worth visiting.



THE JOURNEY STARTS HERE...

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Bonus CD software
XMLSPY 5.0 Home Edition.
GETTING MONTY'S MUG COVER CD

The secrets of XMLSPY

Using XMLSPY, *David Williams* explains how to create a Web service that runs Google searches — without firing up a Web browser.

There's been plenty of hype about Web services. So, here's your chance to understand what they are and what they can do, by rolling one of your own with Altova's award-winning XMLSPY 5.0 Home Edition. And to top it off, *APC* has the full working version of this version on our cover CD triple set.

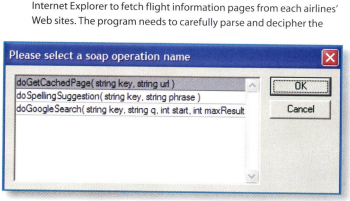
To illustrate how Web services work, we'll show you how to tap into the power of the Google search engine by creating a simple XML Web service. This is just the tip of the XMLSPY iceberg— the program is a complete XML development environment with support for schemas, DTDs, XSL transformation and much more.

To begin, it's useful to emphasise that XML is a text-based standard for passing data between disparate systems. XML is not in itself a programming language, but as long as both ends of a connection use XML to communicate, there are no constraints placed on the programmers at either end.

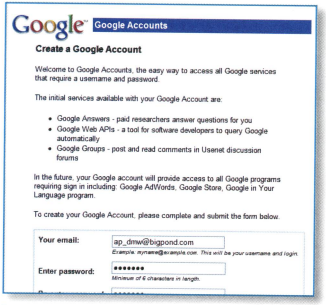
A programmer who produces a Web service makes a body of code available on a Web site for other programmers to use. The internal design of the Web service is hidden and only the functionality it offers is exposed to public view. A programmer who consumes a Web service adds a reference to the service within their own program. They must use a programming language that supports Web services, but apart from this there is no restriction on the language or platform chosen.

There are tremendous advantages to this. Consider a travel agent who wants to automate many manual processes through their Web site. The agent may want customers to reserve flights and book hotel accommodation in a single session, without needing to make phone calls or jump to external Web sites.

The first obstacle is when the travel agent tries to find a way of getting up-to-date flight information from partner airlines. The agent could, for example, write a Visual Basic program that automates Internet Explorer to fetch flight information pages from each airlines' Web sites. The program needs to carefully parse and decipher the Web page returned so as to extract the pertinent information.



XMLSPY: *lists the three Google Web service calls that can be made.*



Three steps: *creating a Google account is easy.*

This exercise has to be repeated for each and every different site that the agent wants to use and each will return data in a different way. Site designs may occasionally change, requiring the agent to make program modifications to suit.

Even if the travel agent can present all the captured information to customers, the problem still remains of actually booking flights and hotels from the original vendors.

If the airlines and hotels provide XML-based Web services, all that complexity disappears. The travel agent's program merely adds a reference to each Web service to be used. The Web service's routines are called to retrieve data and to process reservations as necessary.

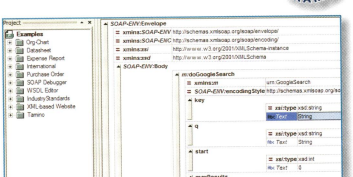
Should any of the original Web sites change their design and overall appearance, the travel agent remains unaffected. The Web services provided by the site continue to function. And because they use the industry standard XML format, there's no burden on any party to use a particular programming language, Web server, operating system or any other piece of technology.

GOOGLING ALONG

Just like the fictional airlines and hotels above, Google provides a Web service. This means that any programmer can add Google search facilities to their own applications, without any regard at all for how this search engine actually works or presents its results.

There are three simple steps to using Google's Web service. First, grab the Google Web APIs Developer Kit (there's a copy on our cover CD, although you can also download it from **www.google.com/apis/download.html**). This developer's kit contains everything

XMLSPY: *displays the request envelope for the doGoogleSearch SOAP request.*



needed to write programs using Google's Web service, including:

- A WSDL (Web Services Description Language) file that can be used by any development platform that supports Web services, such as XMLSPY or Visual Studio.NET;
- A Java library that provides a wrapper around the Google XML Web services interface;
- An example Visual Basic.NET and C#.NET program which invokes the Google Web service;
- Documentation on the Web service methods and capabilities, as well as the Java wrapper library.

The WSDL file is the most essential part. It contains all the information that XMLSPY needs to know to use the Google Web service. This includes the methods exposed by the service, the parameters required and the format of results returned.

After downloading the kit (and agreeing to Google's licensing conditions), unzip it and open README.txt to get started.

The second step is to obtain a licence key and create an account to access Google's Web service. Each licence key is entitled to perform up to 1,000 automated queries per-day (with up to 10 results per query). Many readers may have a Google account already — it's the username and password combination that lets you access all its services.

If you don't have one, create your account at **www.google.com/accounts/NewAccount** and after logging in, request a licence key at **http://api.google.com/createkey**. This will be sent to you via email. The key is essential — it must be passed to Google's Web service along with each query made.

The final step is to use the Web service. Start XMLSPY and click the SOAP/Create new SOAP Request menu. SOAP stands for Simple Object Access Protocol and is the XML-based communications protocol underlying Web services (just like HTTP is the underlying protocol for the Web). Specify the path to Google's WSDL file — either on disk, from the developer's kit, or via **http://api.google.com/GoogleSearch.wsdl**.

XMLSPY quickly processes the WSDL file and displays the methods available. These three methods do different tasks, all powered by Google:

- doGetCachedPage — returns the content of a specified URL as cached by Google when its crawlers last trawled that URL;
- doGetSpellingSuggestion — request a spelling suggestion;
- doGoogleSearch — search Google's database of some three billion Web sites.

WSDL file

The Google Web APIs Developer Kit contains a WSDL file, which is a standard description of Google's search services, encoded in XML. The file is also online at **http://api.google.com/GoogleSearch.wsdl**.

Many programming languages understand WSDL and can use this file to automatically invoke Google's API. For example, the WSDL can be added as a Web reference into Visual Studio.NET, converted into Java code using Apache's WSDL2Java, or used directly by PERL's SOAP::Lite package.

A simple PERL script to find articles about Xbox programming would look like this (replace $key with a valid licence key as emailed by Google):

```
use SOAP::Lite;
my $key='0000000000000000000000000';
my $query="Xbox programming";
my $googleSearch = SOAP::Lite -> service("file:GoogleSearch.wsdl");
my $result = $googleSearch -> doGoogleSearch($key, $query, 0, 10,
"false", "", "false", "", "latin1", "latin1");
print "About $result->{'estimatedTotalResultsCount'} results.\n";
```

Refer to "Modifying Queries" (next page) for details on the parameters used in the doGoogleSearch function above.

The WSDL file's schema can be carefully examined with XMLSPY. Use the File, Open menu to open a disk copy of the file. Click the Schema Design View icon. xmlspy generates a graphical depiction of the WSDL file's structure, its methods and datatypes.

```
<?xml version="1.0" ?>
- <!--
    WSDL description of the Google Web APIs.
    The Google Web APIs are in beta release. All interfaces are subject to
    change as we refine and extend our APIs. Please see the terms of use
    for more information.
  -->
  <!-- Version 2001.08.27 -->
- <definitions name="GoogleSearch" targetNamespace="urn:GoogleSearch"
  xmlns:typens="urn:GoogleSearch"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema"
  xmlns:soap="http://schemas.xmlsoap.org/wsdl/soap/"
  xmlns:soapenc="http://schemas.xmlsoap.org/soap/encoding/"
  xmlns:wsdl="http://schemas.xmlsoap.org/wsdl/"
  xmlns="http://schemas.xmlsoap.org/wsdl/">
    <!-- Types for search - array elements, directory categories  -->
  - <types>
    - <xsd:schema xmlns="http://www.w3.org/2001/XMLSchema"
      targetNamespace="urn:GoogleSearch">
      - <xsd:complexType name="GoogleSearchResult">
        - <xsd:all>
            <xsd:element name="documentFiltering" type="xsd:boolean" />
            <xsd:element name="searchComments" type="xsd:string" />
            <xsd:element name="estimatedTotalResultsCount"
              type="xsd:int" />
            <xsd:element name="estimateIsExact" type="xsd:boolean" />
            <xsd:element name="resultElements"
              type="typens:ResultElementArray" />
            <xsd:element name="searchQuery" type="xsd:string" />
            <xsd:element name="startIndex" type="xsd:int" />
            <xsd:element name="endIndex" type="xsd:int" />
```

Code red: *the XML WSDL file.*

Comic search: *looking for Shaun Micallef. Be sure to enter the licence key as sent by Google.*

Click the doGoogleSearch entry. XMLSPY opens a window containing a SOAP request envelope. This is a new XML document, with spaces for all the parameters required by the doGoogleSearch Web service request.

Locate the key field in the body of the envelope. Highlight the word String in the Text parameter and paste the licence key as emailed by Google. The licence key must be passed with every request to this search engine's Web services.

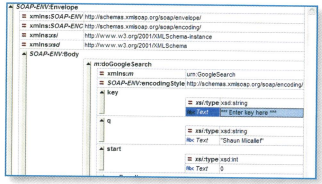
Move down to the q field. Highlight the word String in the Text parameter. Type a search phrase.

Finally, locate the maxResults field. Highlight the number 0 in the Text parameter and enter the number 10. This field controls how many results are to be returned. The Google Web service only returns up to 10 results, regardless of how many potential matches, so it's vital to finetune searches as much as possible. Read Google's Web service FAQ carefully so as to understand the query language and how best to use it.

When ready, click the SOAP/Send Request to Server menu item. Be patient — there will be a noticeable pause while XMLSPY communicates with Google, passing the request and retrieving the results.

Soon a new XMLSPY window opens, with the XML-formatted results, returned by Google. There's a great deal of information listed. The searchTime field displays the number of seconds Google spent processing the search. The estimatedTotalResultsCount field displays the number of individual results that matched the search phrase supplied.

The most important piece of information is in the resultElements section. This field isn't an individual element, but rather holds an array of values — up to 10 in total, with each relating to an individual search result.



Inspect these search results. Each contains various elements describing that result. The URL field cites the actual Web page address of the result. The title field displays the page's title, as stipulated in its HTML file. The summary field gives a brief description of the page's contents, and so forth.

That's as hard as it gets. By continually sending SOAP requests in XMLSPY, search after search can be performed.

Some of the ways in which Google Web services can be used include:

- Issuing regularly scheduled search requests to monitor the Web for new information on a specific subject;
- Performing market research by analysing differences in the amount of information available on different subjects over time;
- Enabling searching via non-HTML interfaces such as command-line applications, or Windows or database applications;
- Making a "super-duper" search program that allows users to easily build-up complex queries in a point-and-click interface;
- Creating innovative games that "play" with information online.

Not only this, but the concepts involved with using Google's Web service are precisely the same for any Web service. And as all the communication to and from Web services takes place in XML, XMLSPY is a perfect tool for experimenting and testing Web services.

Other tools like Visual Studio.NET can then be used to build a graphical application that makes use of the Web services, but XMLSPY is an invaluable "low-level" tool— much like any good database developer always has an SQL tool at hand.

Modifying queries

As well as passing a query to Google, the Web service allows for parameters that customise the search behaviour. The only mandatory values are the licence key and the query.

Parameter	Description
key	Licence key, used for authentication.
q	The actual query to perform.
start	Zero-based index of the first desired result.
maxResults	Number of results desired per query. The maximum value is 10. The number of results may be less than desired, if the query is very specific (like a Googlewhack).
filter	A boolean value to activate or deactivate automatic results filtering, to hide very similar results and results all from the one Web host. Generally, filtering improves end user experiences.
restricts	Restricts the search to a subset of Google's Web index, such as a country (Australia) or topic (Linux).
safeSearch	A boolean value to enable or disable filtering of adult content in the search results.
lr	Language restriction — restricts the search to documents within one or more languages.
ie	Input encoding.
oe	Output encoding.

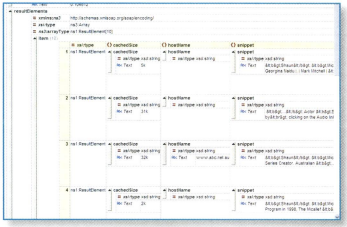
SPELL CHECKING

Google can do more than just search. It also offers powerful spell-checking facilities, and these can also be accessed via the Web service.

Click the SOAP/Create new SOAP Request menu item. XMLSPY again prompts for the WSDL file, retaining the last address given. Click OK to reuse the same address. Only this time, select doGetSpellingSuggestion as the Web service method to use.

doGetSpellingSuggestion is much simpler; XMLSPY again displays the SOAP request envelope but only two parameters need to be entered. One is — as always — the Google licence key, and the second is the phrase to be spell-checked.

Click SOAP/Send Request to Server. XMLSPY again works its magic, passing the request to its Web service, and displaying the XML-encoded result.



Found: *Google's search results, back safely in XMLSPY. Heading the list are a* Seachange *fan site and the ABC.*

The import field in the return envelope is in the return field's Text parameter. This contains Google's suggested spelling revision.

FINDING HELP

Google's Web service is provided free by the search engine, so support is somewhat limited. However, the company does host a newsgroup: **google.public.web-apis**.

It's worthwhile monitoring and contributing to this group to interact with other programmers using the Google Web service in their own applications. This newsgroup can be accessed through Google itself at **http://groups.google.com/groups?hl=en&group=google.public.web-apis**. Additionally, be sure to read the FAQs at **www.google.com/apis/api_faq.html**.

Finally, email Google at api-support@google.com — but note that while it promises that all emails are read, there are no guarantees of a reply.

A bit of history though. Traditionally, programmers partition commonly-used routines into specific, reusable modules. This is a foundational concept in good, structured programming practice. Programmers would make libraries of useful utility functions and reuse these from project to project, compiling the routines into the new application each time.

Taking things further, technologies like ActiveX, DCOM and CORBA were designed to allow pre-compiled routines to be shared between completely separate programs — possibly by different programmers, and running on different computers.

An example is the Microsoft Word COM control, which is silently installed along with Microsoft Word. Programmers are then able to make use of Microsoft Word's functionality from within their own programs by calling routines within the COM control. Microsoft hasn't made the underlying source code available, and the end-user programmer doesn't need it.

As long as the programmer abides by the published list of methods exposed by the COM control, he/she can make use of it.

DEBUGGING SOAP WITH XMLSPY

As a native XML tool, XMLSPY offers invaluable features for software developers working with Web services. When developing an application (in Visual Basic.NET, for example) that accesses data from a Web service and does further data processing, something may well happen that the programmer doesn't expect.

XMLSPY's SOAP debugger can be used to "go in" and see and edit the raw data transmitted between the application in progress and the Web service. This makes it very different from a trace tool, which simply logs every call's request and response envelopes.

Essentially, this works as a proxy server between the program and the Web service — the application thus calls XMLSPY's proxy when invoking a Web service, as opposed to directly calling its endpoint.

Using the SOAP debugger, programmers can set break points (conditional or fixed) for any request and/or response message. These messages can be edited if need be, and the edited request sent back to either the client program or the Web service.

This allows programmers to easily diagnose and rectify problems when dealing with Web services. LTIC

Effective Googling

By default, Google only returns pages that include all of the terms given in the query string. The order of the words can affect the results returned.

Common words (such as and, where, how) are ignored, as well as certain single digits and single letters. To prevent Google disregarding words, enclose them in quotes (for instance, "to be or not to be").

Non-alphanumeric characters are ignored and treated just as delimiters between words in the search query. The exceptions are the ampersand (&) which is treated literally, and the double quote mark ("), and plus and minus signs (+ and -).

Use the plus sign to ensure a word is included in the results. This marks it as essential (for example, Prisoner Cell Block +H).

Use the minus sign to exclude a word from the results (for example, Newcastle -UK).

Search for complete phrases by enclosing them in quotation marks. This means Google will return results where the marked words appear together exactly as entered (for example, "Father Ted").

Many other advanced search options are available. Refer to Google's FAQ on either searching or the Web service for more information. The most important options are listed below.

Search option	Example	Description
Boolean OR search	starving artists OR writers	Use an uppercase OR between two words to retrieve pages that contain either one word or the other (or both)
Site restricted search	Linux site: **www.apcmag.com**	Instruct Google to search within a specific site by entering the query followed by the string site followed by the host name. The minus sign can be applied to remove a Web site from consideration in the search. Only one site term per query is supported.
Title search	intitle:"Author guidelines"	Prepend intitle: to a search term to make Google restrict results only to documents containing the term in their title.
File type filtering	"Author guidelines" filetype:doc OR filetype:pdf	Filters results returned to include only documents that have the specified file extension. There can be no space between filetype: and the extension. Multiple filetypes can be included by adding more filetype: terms to the query. Use the minus sign to exclude specific filetypes.

Bonus CD software
eMule, DC++ and eDonkey.
ON THIS MONTH'S APC COVER CD

The secrets of free P2P

Forget download limits — *Dan Warne* shows how to tap into free peer-to-peer file sharing over almost any broadband connection.

Download limits are the bane of the Australian broadband enthusiast. Broadband provides the speed for file sharing at a fantastic clip, but this usually comes with a strict limit on downloads, and the risk of an excess usage bill if you exceed it.

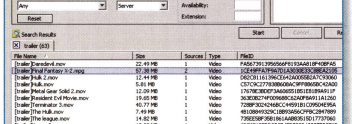
Fortunately, many broadband ISPs in this ferociously competitive market are taking advantage of the minimal cost of transferring data within their networks by offering free peer-to-peer connections between users.

The key to harnessing these free downloads is to get a P2P file-sharing program that can be configured to download only from other users your ISP deems eligible for free P2P.

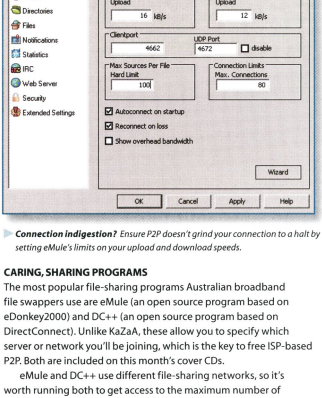
Once you're set up, you'll find customers sharing the same huge range of files as on open P2P networks, but with higher speeds and no fear of passing your download cap.

The first step is to determine if your ISP offers free P2P, and to what extent. Some offer free services only to customers in the same state and others across their entire network. Some providers even let you download from customers on other ISPs connected through the same Internet exchange — the central points where ISPs connect to share data directly at a lower cost than sending it out via the Internet at large.

We can't stress enough how important it is to check your ISP's P2P arrangements. Different ISPs have very different restrictions. Check **broadbandchoice.com.au** for details or contact your ISP.



No donkey: *eMule discovers which users are sharing from a central server and gets files directly from the user.*



Connection indigestion? *Ensure P2P doesn't grind your connection to a halt by setting eMule's limits on your upload and download speeds.*

CARING, SHARING PROGRAMS

The most popular file-sharing programs Australian broadband file swappers use are eMule (an open source program based on eDonkey2000) and DC++ (an open source program based on DirectConnect). Unlike KaZaA, these allow you to specify which server or network you'll be joining, which is the key to free ISP-based P2P. Both are included on this month's cover CDs.

eMule and DC++ use different file-sharing networks, so it's worth running both to get access to the maximum number of shared files. The jury is out over which is better. DC++ can find files faster because it connects to a central hub that lists both users and files being shared, while eMule discovers only users sharing from a central server and gets file lists directly from them.

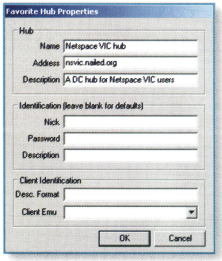
However, DC++ lets you download a file from only one user at a time whereas eMule can fetch the same file from several users at once by breaking it into fragments.

The effect is to reduce the traffic on any single user and boosts the overall download speed for everyone.

SETTING UP EMULE

eMule is fairly easy to use. The challenge is ensuring it downloads only from other users your ISP deems eligible for free P2P. This involves modifying eMule's IP filter file, and it's tricky to manually set up.

You need to research which IP ranges are "free" on your ISP and get the format of the IP filter file just right so that eMule can understand it.



Simple to set up: *but you won't be able to connect unless you are on the right ISP, in the right state.*

Fortunately, in most cases, someone else has already done the hard work. Several community sites let you download the correct config files and drop them into your eMule program folder. The files you need to snag are:

- **ipfilter.dat:** includes a list of IP address ranges for free P2P. This list can change daily as ISPs change their commercial arrangements, and users find mistakes in the file, so update it often.
- **preferences.ini:** includes optimal eMule settings for your ISP (including the local chat server).
- **staticservers.dat:** lists servers run by users on a particular Internet exchange (for example, West Australian Internet Exchange). These servers provide a constantly updating list of users sharing files at any one time so eMule knows where to search.

To get the files, first you need to identify which Internet exchange your ISP is connected to in your state (assuming your ISP offers free P2P to other users on the same exchange in the state).

For example, NSW customers of iiNet and Netspace peer through the PIPE Internet exchange — **www.netspace.net.au/~pfarac** provides all the files you need to get started. Victorian customers of Netspace, iiNet, Alphalink or Comindico-based ISPs nationally peer through the VIX/AUSIX Internet exchange, and can find the files they need at **http://DIY.vixmule.net**.

There are also user-maintained sites and config files for SA and WA (see table, below right). Some allow you to download eMule with the files already in place.

Once eMule is running with the modified files, if you have a firewall, open port 4662 (TCP) and port 4672 (UDP). If you're using NAT connection sharing, forward the ports to the correct IP address on your local network.

Even when correctly configured, ZoneAlarm is known to cause eMule problems. eMule uses a credit system to encourage users to share files. When you allow a fellow user to download files from your PC, eMule records it at the other end.

When you go to download files from that same user, you'll get a higher priority than other people. Over time this amounts to credit with other users and results in faster downloads.

SETTING UP DC++

DC++ is simpler to configure than eMule. Instead of having to get setup files for an IP filter, all that's required is the address of a DirectConnect "hub" run by a customer on the Internet exchange your ISP uses.

The downside is that server names change; users take servers down and new ones spring up. A good place to find current DC hub addresses is Whirlpool's peer-to-peer discussion forum at **http://forums.whirlpool.net.au/forum-threads.cfm?f=87**.

Armed with the DC hub address for your ISP, state and Internet exchange, start DC++, click the Favourite Hubs button on the toolbar, click New, enter a name and the address for the hub, click OK and you're away.

In general, DC++ hubs require you to share a minimum quantity of files or you can't download from other users.

To get started with sharing your own files, click Settings (in the File menu), and select the Sharing tab, click Add Folder and then browse to the folder you want to share.

When you're downloading with DC++ you'll have to wait for a "download slot" to become free on the other user's PC. Because all residential connections have quite limited upload speeds, most users set a maximum of two or three concurrent uploads at once to ensure that files can be sent in acceptable amounts of time.

Some people like to use a modified version of the DC++ client, which is known as Black Claw DC++ or BCDC++. This boasts extra features, such as the ability to limit your upload speeds to prevent your Net connection becoming so congested that you can't send network requests.

BCDC++ requires DC++ to be installed first. Then extract the files from the BCDC++ archive into the DC++ directory, overwriting some of the original files. You'll find many additions under the program settings, especially a new tab for bandwidth limiting. You should set your upload limit a few KB below your connection's maximum upload speed. STOP

Make the right connections

Where to get the eMule config files for your state's Internet exchange.

State	Internet exchange	Web site
Vic	VIX/AUSIX	**http://DIY.vixmule.net**
NSW	PIPE	**www.netspace.net.au/~pfarac**
SA	SAIX	**http://saixdonkey.sytes.net**
WA	WAIX	**http://waixreactor.waixusers.net**
Qld	PIPE	Files not yet available.
Tas	N/A	No eMule group.

For the latest DC++ hub addresses, visit ***http://forums.whirlpool.net.au/forum-threads.cfm?f=87****. Unless you are connected to the state's Internet exchange, you may not be able to access the state Web sites listed above.*

Bonus CD software
98lite Preview 4.5

A slimmer Windows 98

***Joe Cassels* reveals how to boost boot-up times and performance by trimming the fat from Windows 98SE.**

Despite Microsoft's best efforts with Windows XP, plenty of people are still running various iterations of the Windows 9x line, on PCs serving a wide variety of purposes, such as running simple applications and providing Net access.

But it's not unusual for those older machines to be pushed to the limit, often because of unnecessary background operations caused by Windows' built-in bloat. Here's how to make the most of the PC you've got right now, by putting Windows 9x on a crash diet.

THE LITE TOUCH

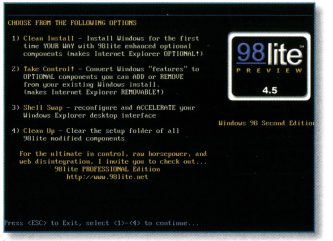
This month's speed feature (beginning on page 82) reveals some canny tricks and tweaks to pep-up Windows, but on the Windows 9x platform these can only take you so far. The real secret to a slimmer version of Windows 95, 98, 98SE or Me begins with 98lite. This clever app allows you to uninstall Internet Explorer — something that can't be done using the Control Panel's Add/Remove Programs applet — as well as other system tweaks.

A free demo version of 98lite is on this month's cover CD set, and while it has some limitations, it's enough to wave goodbye to IE and remove Web integration from the Windows shell. The Professional version offers more features, and *APC* readers qualify for a 50% discount.

Removing Internet Explorer is about more than just winning back 35MB of hard disk space — Windows runs a lot faster without the browser engine, which underpins the Explorer shell in 98SE. An IE-free Windows also tends to run other browsers, such as Netscape Navigator, with fewer crashes.

You can use 98lite in one of two ways: by uninstalling features within an existing installation, or, altering Windows' own installation files so you can set up Windows 98 cleanly with unwanted options already removed. The latter approach gives greater stability, but is more time consuming than carving up an existing installation.

Start by installing 98lite under Windows 98, then use it to copy the CAB files from your Windows 98 CD to your hard drive, modifying them as necessary. You can then opt for clean install, which renders Internet Explorer as an installation option rather than a must-have component. You'll need to provide your CD key during the course of the installation.



Pick a number: *98lite Preview offers four ways to slim down Windows 9x.*

Editing an existing installation appeals to those of us who like to apply minimum effort for maximum effect. You still have to copy the CAB files from your Windows CD because 98lite needs to run from within a folder that contains them. Opt to convert Windows features into optional components. Once processed, you can remove Internet Explorer and Windows Update in the same way as other components.

With IE consigned to the scrap heap, what browser should you use? We suggest Opera 7, which has a 12MB footprint compared to IE's 36.9MB. You can try out Opera for free — registration costs in the region of US$39.

SHELL GAME

Web integration in Windows 98 never seemed worth the resources it used. It's worth losing the convenience of launching some operations with a single click, rather than a double click, in return for a more responsive system.

As for crafting your desktop from a Web page, this trick may be amusing, but it has little enduring appeal. 98lite enables you to switch this interface for the much faster Windows 95 version, as long as you have a licensed version of Windows 95. Launch 98lite from its location among the Windows 98 CAB files. Go to the Shell Swap option, where you have the choices of Sleek, Chubby or Overweight.

Overweight is the existing Windows 98 or Me interface with full Web integration. Chubby limits the Web integration in exchange for improved performance. Sleek, as the name suggests, is the fastest shell — it installs the Windows 95 shell with no Web integration. If you choose Sleek, supply the Windows 95 CAB files via CD or a hard disk location. It takes a little while to convert the shell and persuade some Windows 98 components to cooperate, but you'll notice a significant speed boost.

APC reader offer

The preview edition of 98lite Professional comes without any time limits or nag screens, and gives you a taste of what the full program can do. The full 98lite professional hacks away 27 more Windows components and swaps Microsoft's shell for the lightening-fast 98Micro version, which removes all Microsoft HTML integration. This doesn't stop you from using Office 97 or most common Web browsers and email clients.

98lite Professional usually sells for US$25, but is available to *APC* readers for a 50% discount at *www.litepc.com/apc.html*.

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Bonus CD software
The latest stable Linux kernel (2.4.20).

Speed up your system

Fast lane Linux

Linux rolls out of the garage with grunt to spare, but there's nothing stopping you from boring out the pistons, tweaking your fuel mix and supercharging your OS. *Paul Robinson* puts you in the driving seat.

Thanks to its meagre system requirements, Linux is often run on second-hand computers with far less grunt than many machines sold today. For those using slower hardware, it's practically a necessity to finetune Linux once it's installed to make it as fast as possible. For others, it's simply the challenge of pushing the envelope with everything they do. Whatever the motives, it's always satisfying to squeeze a bit of extra performance out of your system — the satisfaction of getting something for nothing is great.

There are four key areas in which the performance of a Linux box can be tweaked for a speed boost. Recompiling the kernel, streamlining the boot process, tuning up your hard drives and trimming down your window manager.

RECOMPILE YOUR KERNEL

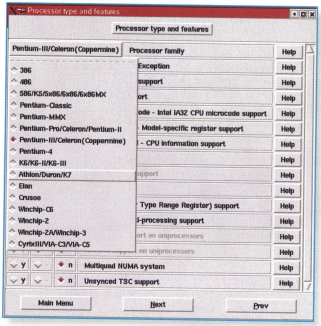
The kernel is the heart of Linux and therefore its ability to run as fast as possible will affect the entire system. Recompiling the kernel for your CPU model can improve system performance, as it can make use of better algorithms found in the newer CPUs instead of relying on the stock standard i386 architecture. This was a trump card of Linux until Windows began shipping compiled for the i586 architecture.

Linux also ships with an i586 optimised kernel as standard, however, performance gains may be achieved for owners of other CPU models by recompiling the kernel for the relevant CPU type. Many popular x86 models are supported — such as Athlon, Duron and the VIA-C3 processors — as well as separate categories for the Pentium series and lots more.

The latest stable kernel can be found on the cover CD. To optimise it, unpack the kernel source from the CD to a suitable location on the Linux box, such as /usr/src. Before proceeding, make sure there is a rescue disk on hand to help boot the system if there are any problems.

Enter the directory it creates (linux-2.4.20) and type `make mrproper` to clean things up. When this is done, it's time to start the graphical configuration process with the `make xconfig` command. If you are not using X Windows, type `make config` to create a text-based version.

Start from the first category and work through them using the Next and, if necessary, Previous buttons. Always read the help for each option as it often contains valuable information and recommendations for your choice. As a general rule, if you're unsure about needing a particular device or section, compile it as a module so that it can be loaded at a later date. For most people a couple



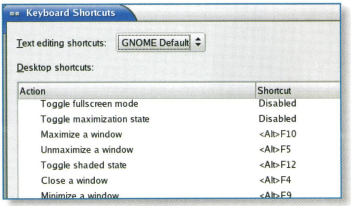
The kernel: *optimising the kernel for your CPU type can lead to improved performance.*

of options that should definitely be answered No to are: those regarding development drivers at the start of the config process; and the kernel hacking questions at the end. While some development drivers may provide an increase in speed, it's best not to sacrifice stability to achieve this.

When finished, save and exit the Kernel Configuration tool and return to the terminal window. The next step is to correctly set up all the dependencies with the `make dep` command. With the dependencies taken care of, the kernel can now be compiled by typing `make bzImage`. If any parts of the kernel were configured as modules, run `make modules` and then `make modules_install` to compile and install the modules that may be required by the kernel. In order to boot the new kernel it should be copied from ./arch/i386/boot/bzImage to the same location as the current kernel, which is almost always the /boot directory.

The final step involves configuring the bootloader, called LILO, so that the new kernel can be booted. Edit /etc/lilo.conf with your favourite editor and add an entry for the new kernel image. The easiest way to do this is copy the details of another image and change the label and image filename entries. If the kernel was compiled with RAM disk support, update the initrd entry or remove the entry if it was compiled without.

Now it's time to change the default option if you wish and save the file. Run `/sbin/lilo` to update the bootloader and, provided



Shortcuts: *customising keyboard shortcuts can greatly reduce the time taken to issue a command.*

there were no errors, reboot the machine. The new option should be available when the bootloader prompts for a choice and after choosing the system should start up with the newly optimised kernel. If there are any problems reboot into the old kernel and repeat everything from make xconfig to fix the configuration.

BOOT TIME

Altering the list of services that start during the boot sequence can reduce the time Linux takes to load. Many of the services available during installation aren't required — depending on the role of the system. For example, a desktop system probably doesn't need the Apache or Postgresql services. Likewise a Web server probably wouldn't need a printer service chewing up valuable resources.

The service manager simplifies the process of controlling which services start at boot. An example of this is the Services section in the Mandrake Control Centre. This section displays a list of available services, whether they are started or not, and whether they are flagged to start on boot. By checking and un-checking the boxes, the list of services that start the next time the system is rebooted can be changed.

The process is fundamentally the same for other distributions, although the tool names differ from distro to distro. One tool found in the majority of distros is chkconfig. This text-based config tool can list and modify which services start for each runlevel. The run levels normally used are 3, multiuser console mode and 5, which is the multiuser graphical mode. The others, such as 0 and 6, are used for shutting down and rebooting the system.

The command chkconfig --list will show the current settings of each service for each runlevel. It can also change whether a service starts at boot or not. Typing chkconfig --level 5 sound off would stop the sound service from starting in graphical mode for example.

HARD DISK

If Linux is running an IDE hard drive then chances are the drive isn't running as fast as possible. hdparm, an easy-to-use hard disk utility that can both benchmark your drive and change the parameters, is usually installed by default. It's still common for many distros to run drives in 16-bit mode, even though 32-bit mode is available. Since the hard drive is one of the slowest components in a computer, improving its speed can have dramatic effects on load times and system performance.

Assuming there is a hard drive set to Master on the first IDE channel of the motherboard, type the following at the shell to check the speed of the drive:

```
hdparm -Tt /dev/hda
```

You should see something like:

```
/dev/hda:
 Timing buffer-cache reads:   128 MB in  1.42 seconds =90.14 MB/sec
 Timing buffered disk reads:  64 MB in 17.21 seconds = 3.71 MB/sec
```

This is far from the transfer speeds that this drive should be able to achieve. Type hdparm /dev/hda to list the current parameters. The output will most likely start with:

```
/dev/hda:
```

Speed-up your key strokes

*Speeding up Linux isn't restricted to boosting the OS or the programs running on it. Optimising the user can also improve the pace at which things get done. This means learning some shortcuts to optimise how you use the system. Keyboard shortcuts help reduce the time taken to complete a task. As with Windows programs, most keyboard shortcuts are listed in the program menus, but a list of standard reserved KDE shortcuts can be found on the developer site (**http://developer.kde.org/documentation/standards/kde/style/keys/index.html**). Keyboard shortcuts in Gnome can be customised in the Preferences screen (Edit, Preferences) when using Nautilus. By editing an "action", the shortcut for a particular command can be changed to reduce the time it takes to issue a command.*

Terminal use can also be sped up with a couple of tips. The Tab key is an auto complete shortcut. For example, typing cd /ho *and then pressing Tab will auto complete the directory to cd /home/. It also works for programs found in one of the paths available. Typing* chm *and then pressing tab will complete to chmod command. If more than one entry matches it will complete the common portion and beep for user input. Pressing tab twice will show a list of commands that match what has currently been entered.*

Another way to speed up terminal use is to create aliases for common commands. An alias doesn't replace the name of a command, rather it's a synonym for it. By typing alias hm='ls –la /home' *an alias has been created called hm. If you type* hm *it will then show the contents of the home directory (it's really running "ls –la /home"). This is an ideal way to speed the process up if you find yourself constantly typing the same command. For those who want to have the alias available each time they log in, add the alias to the .bashrc file in the home directory.*

By using some, or all, of these tips Linux will respond quicker to commands and load programs faster than a standard installation. It will also improve the usability on older systems.

Keep it simple: *complex background images can bog down slower systems.*

```
multcount  = 0 (off)
I/O support  = 0 (default 16-bit)
unmaskirq  = 0 (off)
using_dma  = 0 (off)
keepsettings =  0 (off)
```

Should the I/O support already display 32-bit, and if the benchmark results were far greater than those above, then the drive's parameters don't need to be modified. If I/O support is set to 16-bit, as was the case with our test machine, enabling 32-bit support can double performance. Also, multcount is set to 0, which is far less than the optimum amount. Multcount is the number of sectors to grab in each interrupt. By enabling these options system overhead will be reduced by 30% to 50% and data throughput will increase by 5% to 50%. UltraDMA should also be enabled.

Before proceeding, make sure you understand that this program can damage the drive if incorrect parameters are passed to it. Only type the following command if you're sure your drive is an Ultra DMA 66 drive and if you are willing to accept the consequences of any data corruption that occurs.

```
hdparm -X66 -d1 -u1 -c3 -m16 /dev/hda
```

It should produce an output along the lines of:

```
/dev/hda:
 setting 32-bit I/O support flag to 3
 setting multcount to 16
 setting unmaskirq to 1 (on)
 setting using_dma to 1 (on)
 setting xfermode to 66 (UltraDMA mode2)
 multcount    = 16 (on)
 I/O support  =  3 (32-bit w/sync)
 unmaskirq    =  1 (on)
 using_dma    =  1 (on)
```

After benchmarking the drive again there should be a sizable increase in speed. In our case, the drive produced the following results:

```
/dev/hda:
```

Window dressing

There are many window managers available that are aesthetically pleasing but don't hog system resources like KDE/Gnome. Chief among them are Icewm, Window Maker and BlackBox. They're all light on resources and worth a look.

Window Maker: ***www.windowmaker.org***
ICE WM: ***http://icewm.sourceforge.net***
BlackBox: ***http://blackboxwm.sourceforge.net***



```
Timing buffer-cache reads:   128 MB in  1.43 seconds =89.51 MB/sec
Timing buffered disk reads:  64 MB in  3.21 seconds =19.93 MB/sec
```

The transfer rates have improved by over 500%. That's pretty impressive work from a single command.

SPEEDING UP YOUR WINDOW MANAGER

Window managers have come a long way since the early days. The latest versions of KDE and Gnome are easier to use and have visual effects such as animated icons and fading menus. This is great for modern systems with the processing power to generate these effects in a timely fashion, but if you're using an older machine it may struggle under the graphics load.

Whether you use KDE, Gnome or another window manager, the performance of the system can be noticeably improved by following a few simple steps. Common methods that work in both KDE and Gnome are to turn off any eye candy, only use a plain, single colour background instead of an image, and shutdown any non-essential daemons or programs that may run by default, such as event sounds.

Most of these can be found in the KDE or Gnome Control Centres, but a few tricks specific to each are mentioned below.

KDE's performance can be boosted by turning off knotify, kwrited, klipper and the alarm daemons. For example, klipper can be disabled by right-clicking on its icon in the taskbar and selecting Quit. KDE will then ask if klipper should be started at login, and simply selecting No will disable it.

Turning off these non-essential functions will help KDE respond a lot quicker to user input.

There are two ways to increase Gnome's speed. In the preferences of Nautilus (Edit, Preferences) there are two sections of interest, Views and Preview. Under Views make sure that the icon zoom level is set to 100% to avoid resizing them and select the Show only folders in the Tree View Defaults. In the Preview tab, turn off all the options available.

In the Panel Preferences (Edit, Preferences, Advanced) Gnome can be further sped up by selecting the Close drawer when launcher is clicked and deselecting Drawer and Panel Animation options.

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Bonus CD software

jabber-1.4.2a-mdk.i586.rpm, jabber-conference-1.4.2a-6mdk.i586.rpm, jabberd-quickstart-0.2-linux.tar.gz, jabuser.sh

Let's Jabber

***John Heller* reveals how to run your own instant messaging server and join a worldwide network.**

Instant messaging has been a huge hit. Seemingly everyone wants their own slice of the talkfest — but each IM client insists on speaking its own language. ICQ, Yahoo Messenger, AOL Instant Messenger and Microsoft's MSN and Windows Messengers all use proprietary protocols, requiring people who want to chat together to all use the same system or to run multiple-client programs, one for each of their groups of friends.

But there is a better way — it's called Jabber. It's totally free (and without in-your-face adverts), private and very flexible. Jabber opens the door to IM for use in companies, clubs and societies, as well as individuals.

Technically speaking, Jabber is an open standard XML protocol definition for real-time exchange of messages and "presence" between any two points on the Internet. The core protocol is called XMPP (eXtensible Messaging and Presence Protocol). Several commercial IM systems aimed at corporate users have been based on it, and there are numerous open source implementations.

Jabber provides the same features you'd expect from the big-brand rivals, which Jabber developers like to call "legacy" IM systems. It indicates presence (whether someone is online and active at their computer), and allows instant one-to-one chat, group chat and even file transfers.

It also has a growing range of add-on components and services, including transport gateways to legacy services that allow Jabber users to maintain their existing contacts on other networks using only their Jabber client.

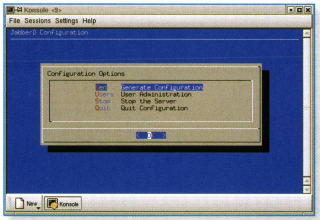
The Jabber Software Foundation is the driving force behind the development of the protocol and many of the open source servers, clients and tools. Its home on the Net, **www.jabber.org**, is the best place to look for all things Jabber.

HOW IT WORKS

Unlike the legacy systems, which are all based around a monolithic central server, Jabber uses a distributed client/server architecture that's remarkably similar to email. This has several advantages, the foremost being an enormous flexibility in the way it can be deployed and scaled. It also reduces namespace problems, so users don't have to take an ID like john58739. Like email, the servers use DNS names and each user's unique Jabber ID is written using the familiar email construct of user@host.

Each user has an account on a Jabber server, and configures their Jabber client to connect to and log in to that server. The client talks only to this server, and the server relays information and messages to other users via whatever server they are logged into.

The beauty of this distributed system is in its flexibility. Anyone can set up a Jabber server and use it however they wish. It can be used in a closed group, or it can join the growing worldwide network. A Jabber server can be deployed behind a company firewall for totally secure internal communications. At the same time, it may talk to external Jabber servers, allowing its users to communicate with the world at large.



Simplicity: *the jabberd-quickstart configuration has an interface to stop and start the server and manage user accounts.*

A club can run a server on the Internet with registered accounts only for its members, providing private chat rooms and file swapping. And individuals can use open public servers that allow anyone to register an account and communicate with friends anywhere in the world, as they do with existing IM services.

LINKS TO CLIENTS

A wealth of Jabber clients are available for all platforms: Windows, Unix/Linux and Mac. Their features vary and the final choice often comes down to a matter of taste. The common feature of all is the "roster". This displays the user's contacts, with an indication of their presence, in the main window. They all support one-on-one chat sessions. Most clients also permit group chat, and also some way to browse add-on service components installed on the server.

The Jabber Software Foundation site (**www.jabber.org/jsf**) has links to a wide range of clients, both free and commercial, along with tables comparing features (Linux users may already find Jabber clients installed as part of Gnome or KDE).

Also available at the site is a list of public Jabber servers that allow anyone to register an account. Once you have a client running, you can immediately start using Jabber.

SETTING UP A SERVER

Jabber servers are available for all flavours of UNIX (including Linux) and Windows, although all of the Windows implementations to date are commercial. This leaves Linux as the platform of choice. The first server written, and still the reference implementation, is the open source jabberd. There are two ways to get a jabberd server up and running, but first you need to make sure the server will be accessible.

There are two (or possibly three) TCP ports that need to be considered, depending on where the server is located. You may need to open some ports on a network firewall, or on the firewall running on the server computer itself. Port 5222 is used for client-



Presence: *the Jabber interface displays the availability status of your contacts, friends and colleagues.*

to-server communications. Port 5223 may also be used for SSL-encrypted connections. These ports must be open or clients won't be able to reach the server. If you want to allow server-to-server communications (to reach Jabber users on other servers), then port 5269 must also be open.

The first server option, known as jabberd-quickstart, is very quick and simple to get going, but is ultimately limiting in what you can do with it. You might want to try this out first to see the possibilities of a Jabber server in action, before deciding whether to invest a little more time in a proper setup. You don't even need superuser privileges to try this. All you need is the file jabberd-quickstart-0.2-linux.tar.gz, which can be downloaded from **http://jabberd.jabberstudio.org/quickstart**. Unpack it, then run the setup.sh script using these commands:

```
tar xvzf jabberd-quickstart-0.2-linux.tar.gz
cd jabberd-quickstart
./setup.sh
```

You'll be asked a few questions the first time you run jabberd-quickstart and it will create a configuration file and then throw you into a simple management interface that enables you to stop and start the server and manage user accounts. Once the server is running, you can start up a client and log in to it.

The main drawback with this simple tool is that it doesn't set up a server that will be started automatically at boot time, and it's not easy to add components, such as the group chat facility, because it overwrites the configuration file whenever you run it.

If you want a properly configured and extensible Jabber server, a full jabberd implementation is the better long-term option. The source can be downloaded from **http://jabberd.jabberstudio.org**, or you can install a pre-compiled package for your favourite Linux distro.

MANDRAKE LINUX

The Mandrake RPM for installing jabberd is on this month's cover CD set. The file is called jabber-1.4.2a-6mdk.i586.rpm. The Mandrake RPM installs a second config file called jabber.cfg in addition to the normal jabber.xml. Both of these are in /etc/jabber. The server startup script (/etc/init.d/jabber) sources this file and uses two variables, if they are defined, to override settings in the jabber.xml file. The variables are JABBER_HOSTNAME and JABBER_SPOOL and they override the hostname and spool directory where Jabber accounts are stored. This config file can be deleted if desired and all configurations will come from the jabber.xml file.

In the best traditions of the UNIX world, all configuration of the jabberd server is done by editing a text file (/etc/jabber/jabber.xml). Don't be put off by the lack of a GUI — the file comes with sensible defaults and is well commented. A basic understanding of XML tags will help, but is not essential.

There are two important configuration settings which should be checked. The first is the server name. This must be set to match the name the clients will use to find and connect to it, or it will refuse connections. It is best to use its fully qualified DNS name — host.domain.

The second configuration parameter is the spool directory. This is where user accounts are kept. You may want to change this from the default /var/lib/jabber. You should back up this directory regularly.

Look for the following two lines in jabber.xml (they'll be at different places in the file):

```
<host><jabberd:cmdline
flag='h'>localhost</jabberd:
cmdline></host>
```

and:

```
<spool><jabberd:cmdline flag='s'>/var/lib/jabber</jabberd:cmdline></spool>
```

Replace localhost with the real host name, and change /var/lib/jabber to a different spool directory if you wish.

AUTO BOOT

Your package installer will probably configure the server to be started automatically at boot time. It can be started and stopped manually via the services manager on your Linux distro, or you can do it the old-fashioned way on the command line:

```
/etc/init.d/jabber start
/etc/init.d/jabber stop
```

This is a basic server without any additional components. It is configured for server-to-server communications, so it can talk to other servers on the Internet, and it will probably have an SSL key installed so encrypted client-to-server communications are possible. It will also allow open registrations, which may not be what you want.

Adding gateways

Popular components to add to Jabber servers are "transport gateways" to the various legacy IM services — MSN, Yahoo, AIM and ICQ. Each requires installation of a package to install the dynamic library, plus editing of jabber.xml in two places (as seen in the conference example on the following page). Examples of what to put in the file come in the documentation with each package.

The user must have an existing account with MSN, for example. Through their Jabber client, the user registers with the server's MSN gateway and provides their MSN login details. This information is stored with the user's account on the Jabber server and is used to log into MSN when the user logs into the Jabber server. The user thus appears to be online to their MSN contacts, and those contacts are in turn displayed in the user's roster. Two-way presence information and chat is relayed via the Jabber server to the MSN server.

When the user registers with a gateway service, an item is added to the user's roster representing their login on that IM service. This can be used to log in or out of that service at will, while remaining online to Jabber contacts.

CONTROLLING USER ACCOUNTS

You may want only your club members to be able to use it, or you may want stricter control over user identification in a corporate situation.

You can disable registrations by editing the configuration file and commenting out certain sections. These are the <register> and the <mod_register> tags, which are in different parts of the file. Simply put comment delimiters around the sections. After editing, you will need to stop and restart the server for this to take effect.

```
<!--
<register notify='yes'>
 <instructions>
  Choose a username and password
  to register with this server.
 <instructions>
 <name/>
 <email/>
<register>
-->
```

and:

```
<!--
<mod_register>./jsm/jsm.so</mod_register>
-->
```

If registrations are disabled, you need to be able to create the user accounts manually. This can be done with the simple command line script jabuser.sh that is provided on the cover CD set.

Copy the file to somewhere on your local disk and make it executable. You run the script with two parameters — a username and a password. It will create user account files under the Jabber spool directory. You should do this while the server is stopped.

```
chmod +x jabuser.sh
./jabuser.sh john hispasswd
./jabuser.sh mary herpasswd
```

This is a very simple script, and accounts created by it can be accessed only with cleartext passwords. More advanced Linux users can use the Perl script jcac (available at **www.inutility.net/files**). This requires some knowledge of Perl, and certain Perl modules to be installed, but it can create accounts that can be accessed more securely.

INSTALLING COMPONENTS

Components are basically dynamically loaded libraries (SO files in Linux) that provide a particular service. Installing them involves installing the library file (usually by installing a package) and editing the configuration file to tell the server where to find the library and what service it provides.

Each service component is named with a Jabber ID (JID), and the name chosen for this limits whether it will be available only to local account holders on the server or to Jabber users everywhere. If the JID is "something.localhost", it will be accessible only by local users. If you want the world at large to have access to it, the JID must be a DNS name that resolves to the server's IP address.

For each component, jabber.xml must be edited in two places. Firstly, a section must be added to the <browse> tag. Most Jabber clients allow the user to browse the components the server has installed. Adding an entry in the <browse> tag will advertise the availability of the service. Each entry within the tag defines the type of service, its Jabber ID and a name to be displayed in the browser.

Next the service itself must be defined using a <service> tag. The service is named with a Jabber ID, and information in the tag defines which library file to load, plus other things relevant to the service. Once a component is added, the Jabber server must be stopped and restarted for it to become active.

CONFERENCE CALL

The conference service provides group chat rooms. These can be either public (advertised and always open) or private (known only to invitees). As described above, by choosing an appropriate Jabber ID for the service, access to conference rooms can be limited to local account holders on the server, or to the world at large. This can also be used as an example for adding other services.

Install the Jabber-conference package using your usual method. Then edit jabber.xml in the two places. First, add a line within the <browser> tag — that is between <browse> and </browse>.

```
<browse>
...
<conference type="private" jid="conference.localhost"
  name="Private Conferencing"/>
...
</browse>
```

The JID in this example will restrict access to the rooms to local account holders. Now add the service tag. This can be added anywhere within the top-level <jabber> tag, but not within a lower-level tag. You will see some commented-out examples — put it near them. Note that the ID must match the JID defined above.

```
<service id='conference.localhost'>
  <load><conference>/usr/lib/jabber/conference.so</conference></load>
  <conference xmlns='jabber:config:conference'>
    <private/>
    <history>30</history>
    <vCard>
      <FN>Private Conferences</FN>
      <DESC>This service is for private conferencing rooms.</DESC>
      <URL>http://foo.bar/</URL>
    </vCard>
    <notice>
      <join> has joined</join>
      <leave> has left</leave>
      <rename> is now known as </rename>
    </notice>
  </conference>
</service>
```

Restart the server and log in again. The browser in your client should now show Private Conferencing and you should be able to create a conference room. Specify the conference JID (conference.localhost) as the conference server and give the room an arbitrary name. You can then invite others to join you in the conference room.

The example configuration code above creates private rooms. The documentation that comes with the Jabber-conference package provides code examples for configuring public chat rooms.



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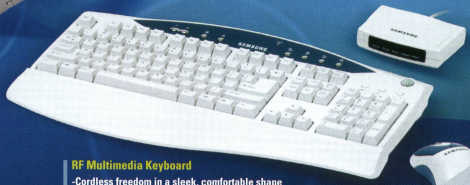


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Speed up Your System

Flying Photoshop

***Trevor Morris* prescribes 30 quick tips to help you work faster and smarter in Photoshop.**

Part of what makes Photoshop such an incredibly powerful program is its well-thought out interface. In the majority of circumstances, its tools and commands are made accessible via a combination of palette controls, menu commands, context menus and keyboard shortcuts. In fact, Photoshop probably has one of the most extensive, and impressive, keyboard implementations of any program on the market.

There's so much "hidden" power built into Photoshop that you'll undoubtedly keep discovering new techniques for years to come. To help fast track your learning curve, here are 30 timesaving techniques for improved efficiency.

QUICK COMMANDS

- You've probably discovered that double-clicking on Photoshop's background is a convenient alternative to selecting File, Open or pressing Ctrl+O — but did you know that there are several more document commands that can be accessed by adding the following modifier keys?

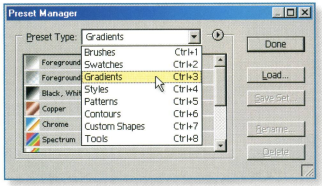
Action	Command	Shortcut	Menu
Double-click	Open	Ctrl+O	File, Open
Ctrl+double-click	New	Ctrl+N	File, New
Alt+double-click	Open As	Ctrl+Alt+O	File, Open As
Shift+double-clickFile	Browser	Ctrl+Shift+O	File, Browse
Alt+Shift+double-click (with a file open)	Save As	Ctrl+Shift+S	File, Save As

- Right-click on an image window's title bar to quickly access the following commands: Duplicate, Image Size, Canvas Size, File Info and Page Setup.

- Undoubtedly the fastest way to duplicate a layer (when there is no active selection) is to press Ctrl+J (Layer, New, Layer via Copy). Add the Alt key (i.e., Ctrl+Alt+J) to name the duplicate layer.

- There are many filters that can't be applied to a layer of their own (e.g., Lens Flare, Lighting Effects, and so on). A quick alternative to duplicating and/or flattening your image is to hold Ctrl, Alt and Shift and press N, followed by E; then apply the desired filter (Ctrl+Alt+Shift+N adds a new layer and Ctrl+Alt+Shift+E stamps a copy of the visible image into that new layer).

- To improve the performance of batch processes, reduce the number of saved history states in the General Preferences, and deselect the Automatically Create First Snapshot option in the History Options (just don't forget to restore these values later).



Preset Editor: *use Ctrl+N and Ctrl+P to go to the next and previous pages of a multi-page dialog; or, use press Ctrl+# to jump to a specific page.*

- By default, the first nine channels of an image have keyboard shortcuts assigned to them. These hotkeys (listed for common colour modes in the table below) may be used to view each channel independently. You can even load the selection of an associated channel (or composite) by adding the Alt key. For example, press Ctrl+Alt+4 to load channel 4 as a selection, or Ctrl+Alt+~ (Tilde) to load the composite selection.

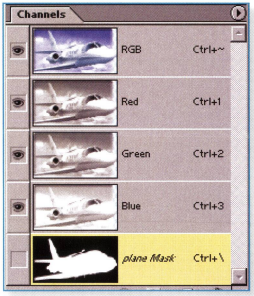
RGB Mode	
Ctrl+Tilde (~)	RGB composite
Ctrl+1	Red channel
Ctrl+2	Green channel
Ctrl+3	Blue channel
Ctrl+4 to 9	4th to 9th channel
CYMK Mode	
Ctrl+ ~ (Tilde)	CYMK
Ctrl+1	Cyan
Ctrl+2	Yellow
Ctrl+3	Magenta
Ctrl+4	Black
Ctrl+5 to 9	5th to 9th channel
Index Mode	
Ctrl+1	Index
Ctrl+2 to 9	2nd to 9th channel

To load the selection of a corresponding layer mask, press Ctrl+Alt+\ (backslash).

ALT-ERNATE APPROACHES

- In many circumstances, the Alt key may be used to toggle/reverse the behaviour of confirmation and warning dialogs

Channels palette: *press Ctrl, plus the channel number, to view the desired channel. Add the Alt key to load a channel's selection.*



within Photoshop. For example, Ctrl+J (File, New, Layer via Copy) doesn't generally display the Layer Properties dialog box; however, to name the layer at the same time, press Ctrl+Alt+J. On the other hand, pressing the Delete layer icon at the bottom of the Layers palette usually displays a confirmation dialog; but, if you Alt-click the icon instead, the selected layer is immediately deleted.

- There are many frequently used commands in Photoshop that don't have associated keyboard shortcuts. Nevertheless, you can quickly access these commands by Alt-pressing the underlined character corresponding to the desired menu, followed by the underlined character(s) associated with the intended command (without the Alt key). For example, press Alt+I, P for Image, Crop; or Alt+L, W, A for Layer, New, Layer Set. To quickly open the last file edited in Photoshop, press Alt+F, R, 1 (equivalent to File, Open Recent, 1 Filename). The numbers 2 through 9 may also be used to open other recent documents.

- Alt-clicking the "right-facing triangle" associated with an action set will expand/collapse all nested actions and steps. Similarly, Alt-clicking a layer set triangle icon will expand/collapse all nested layers and styles.

- Hold down the Alt key to change any dialog Cancel button into a Reset button, allowing you to restore the default values without having to cancel and reopen the dialog box (this works in the majority of Photoshop's dialog boxes).

- Alt-click the Trash icon at the bottom of the Layers palette to quickly delete layers (without confirmation). This technique also works for layer masks and vector masks as well as channels and path layers.

- If you hold both Alt and Shift while opening a PSD (or layered TIFF), Photoshop will give you the option of loading a composite (flattened) version of the selected file(s). Since the flattened version is often 75-90% smaller than the full, layered image, it opens much faster. Note that in order for this feature to work, the option labelled Always Maximize Compatibility for Photoshop (PSD) Files must be turned on in File, Preferences, File Handling (also, be careful not to save over your original image with the flattened version).

- Alt-drag colour stops (or opacity stops) in the Gradient Editor to duplicate them.

HOTKEYS

- There are many occasions where it is quicker (and much more convenient) to navigate the document window via the keyboard.

Here are some useful navigation keys:

Keyboard Shortcut	Result
Home / End	Go to top-left / bottom-right corner of the canvas
PageUp / PageDown	Scroll canvas up / down one page
Shift+PageUp / PageDown	Scroll canvas up / down 10 pixels
Ctrl+PageUp / PageDown	Scroll canvas left / right one page
Ctrl+Shift+PageUp / PageDown	Scroll canvas left / right 10 pixels

- When combined with the modifier keys listed in the table below, the mouse wheel can also become an invaluable navigation tool:

Keyboard Shortcut	Result
Mouse wheel	Scroll canvas up / down one pixel
Shift-mouse wheel	Scroll canvas up / down one page
Ctrl-mouse wheel	Scroll left / right one pixel
Ctrl+Shift-mouse wheel	Scroll left / right one page
Alt-mouse wheel	Zoom in / out in 10% increments
Alt+Shift-mouse wheel	Zoom in / out in 100% increments

- For dialog boxes that contain multiple pages (e.g., Preferences, Preset Manager), use Ctrl+N and Ctrl+P to go to the next and previous pages, respectively. You can also navigate a "multiple page" dialog box by pressing Ctrl+# (where # ranges from one to the total number of pages). For example, to quickly access the preferences for Units & Rulers, press Ctrl+K, Ctrl+5. To activate fields and/or toggle options within a dialog, press the unlined character that corresponds to the desired option.

- Keyboard shortcuts for moving and navigating through layers:

Keyboard Shortcut	Result
Alt+[/]	Activate previous / next (visible) layer
Alt+Shift+[/]	Activate bottom / top-most (visible) layer
Ctrl+[/]	Move layer down (backward) / up (forward)
Ctrl+Shift+[/]	Move layer to bottom (back) / top (front)



Options palette: *palette fields and options may be selected by clicking anywhere on the field label. Use the arrow keys or mouse wheel to select the desired options.*

- If you don't already know them, do yourself a favour and learn the key shorts for each of the tools in Photoshop. You'll be amazed at how much time you save by not having to visit the toolbar every few minutes to swap tools (a complete table of Photoshop keyboard shortcuts is available on this month's cover CD. Also refer to the Quick Reference Card that you'll find with your copy of Photoshop).

RULE THE TOOLS

- Use the hotkeys in the following table to vary the brush for the current paint tool:

Keyboard Shortcut	Result
[/]	Decrease / increase brush size
Shift+ [/]	Decrease / increase brush hardness by 25%
< / >	Previous / next brush
Shift+ < / >	First / last brush
Shift+right-click	Display menu of (blending) modes
Right-click	Display Preset Picker
Enter (or double-click)	Dismiss Preset Picker

- The fastest way to change the opacity of a currently active paint tool or layer is by using the number keys (on the keyboard or on the number pad). Press 1 for 10% opacity, 5 for 50%, and so on: use 0 for 100% opacity. Numbers pressed in succession, such as 8, 5, will result in an opacity of 85%. If you wish to change the opacity of the active layer, be sure to switch to the Move tool or one of the selection tools first.

- With the Move tool (or while holding down the Ctrl key), right-click anywhere on the canvas for a list of the layers under the mouse pointer (ordered from top-most to bottom-most): select a layer name from the list to make it the active layer. Add the Alt key (Alt+right-click) to automatically select the top-most layer under the pointer. Add the Shift key (Alt+Shift-right-click) to link/unlink the top-most layer that intersects with the current layer.

- Use these keys while using any of the paint or selection tools:

Keyboard Shortcut	Result
Ctrl	Access the Move tool
Ctrl+Alt-drag *	Create duplicate of the current layer or selection
Ctrl+Alt+right-click	Select the top-most layer under the mouse pointer
Ctrl+Alt+Shift-right-click	(Un)link the selected layer to the active layer
Shift	Constrain movement to 45° increments

* Add the Shift key to constrain motion to 45° increments.

- To modify several type layers simultaneously, link the desired type layers together and hold the Shift key while changing the desired properties (font, colour, size for example). This feature applies to changes performed in the Options palette, Character palette and/or Paragraph palette.

- Despite the fact that both the Fill command and the Paint Bucket tool are disabled for type layers, Alt+Backspace (fill with foreground color) and Ctrl+Backspace (fill with background color) still work.

- To quickly change the font while using the Type tool, press the Enter key to highlight the font family field and then press the up/down arrow keys (or use the mouse wheel) to choose a font. You can also type the first few characters of the desired font and Photoshop will complete the name.

- If you want to change the attributes for all text on the current type layer, it's not necessary to select the text. All you do is make the desired changes in the Options, Character and/or Paragraph palettes and the type layer will be updated to reflect the changes.

PALETTE POWER

- Click on palette field labels to highlight/select the contents within the field, or to turn checkboxes on/off. If a field or drop down is selected, use the up and down arrow keys (or mouse wheel) to change the values — add the Shift key to change the values by larger increments. You can also increase and decrease slider bars by 1% using the left and right arrow keys, respectively. Add Shift to increase/decrease by 10% increments.

- Press Shift+Enter in palette entry fields to apply the current value but have the field remain active. This is a quick way to experiment with different values.

- Press Enter (or double-click on a tool icon in the toolbar) to reveal the Options palette for the currently active tool. Pressing Enter also highlights the first field in the Options palette (regardless of whether or not the Options palette is already visible) so you can immediately enter a value or choose an option. Use this technique to quickly change the feathering used for a selection tool, or changing the font family for the Type tool.

- Ctrl-click the Delete Layer icon, at the bottom of the Layers palette, to simultaneously delete all linked layers. Add the Alt key (i.e., Ctrl+Alt-click) to delete all linked layers without confirmation. Note that this tip will not work if all layers are linked together, because it is not possible to delete every layer in an image — at least one layer is required in an image. If a layer set is selected, Ctrl-clicking the Delete Layer icon will delete the set without deleting the layers inside. Again, add the Alt key to skip the confirmation dialog. APC

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Speed up your system

Quickest Palm in the west

For pepping up Palm-based handhelds, *Gavin Maxwell's* got a few tricks up his sleeve.

Most Palm OS handhelds use Motorola's Dragonball processor, with speeds ranging from 16MHz to 33MHz, but these chips always have a little more headroom waiting to be unlocked. Utilities like Afterburner and FastCPU allow you to almost double the clock speed, and even tailor the speed on a per-application basis.

Larger or more data-intensive programs can run faster, while slowing the CPU for other applications conserves battery life. It also helps for some apps that don't handle the extra speed too well — which is often the case with communications-related functions such as infra-red or serial data transfer.

Another option is QuickBits Accelerator. While not a true overclocker (in that it doesn't alter the clock speed), QuickBits significantly boosts performance by replacing parts of the operating system with its own faster versions.

Note that none of these programs work on the ARM processors which power the latest Palm OS 5.x handhelds.

For an in-depth article on Palm overclocking techniques, see "Overclocking your Palm" (*APC* March, page 136).

SYNC FASTER

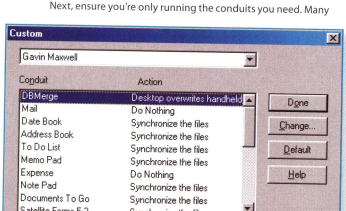
If you perform several HotSyncs each day you'll quickly tire of waiting for the process to end, especially if your HotSync configuration isn't in an optimal state. There are a number of ways to peak-tune HotSync.

First, if you're using an older model that connects to your PC via the serial port, check that your PC's serial port is correctly setup. To modify the connection speed of the serial port click the HotSync icon in the system tray, select Setup, then click the Local tab and choose COM1. This can be locked to a specific speed such as 115,200 or simply set to As fast as possible.

Next, ensure you're only running the conduits you need. Many Palm applications include conduits to provide a link to a desktop program or the Web, and even if you remove the software from your Palm the conduit can remain and slow down every HotSync. To check which conduits are active, click the HotSync icon in the System Tray and select Custom. Removing conduits is typically done via a tool shipped with each application — check the software's documentation for the necessary steps.

If you don't want to remove an application but you don't want it to run during each HotSync, modify its HotSync behaviour by selecting it from the list and clicking the Change button.

Most conduits give you the Do Nothing option — set this as the default action and the conduit will be shelved until you come back and re-enable it.



Be selective: *ensure you're running only the conduits you need.*

LAUNCHERS ON STEROIDS

Palm's built-in application launcher is fine for beginners, but it's usually the first thing that power users ditch. And with good reason: the right replacement launcher lets you spend less time fumbling around at the main menu. Traits of the best launchers include support for multiple tabbed pages where you can group similar apps, plus customizable toolbars and buttons bars for OS functions such as beaming data and deleting apps.

The classic choice of many Palm users is Launcher III, and while it's recently been replaced by Launcher X, the original remains ideal for older model mono Palms such as the III and the basic m1xx series.

Launcher X provides drag-and-drop management of applications, a gadget bar for oft-used functions (such as beaming and deleting) and file management for external memory cards.

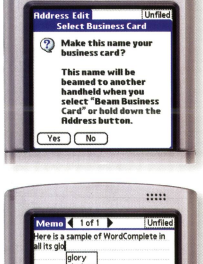
MegaLauncher is another top-rating launcher with tap-hold support — tap and hold an item to be presented with a menu of options. Now you don't need to leave the launcher to view world time — MegaLauncher includes a world time display.

But the launcher that's getting the rave reviews is ZLauncher. This versatile app has drag-drop and tap-hold access, a file management system, two configurable toolbars plus support for background images, and is fully skinnable.

DATA ENTRY

The original concept of the Palm handheld was to act as a window into information residing on your desktop — which implies viewing data as opposed to entering and manipulating it. If you spend a lot of time entering data, follow these tips to gain some productivity.

The built-in Datebook, To Do, Memo Pad and Expense applications let you start writing without explicitly creating a new record. Try it out for yourself: switch into the Memo Pad and then start scribbling. A new entry is automatically created. The Expense application is especially smart at this — it detects the type of data you're entering and sticks it in the right place. If you start writing letters, the data is placed into the Description field, and you'll even see a list of pre-defined descriptions. So to enter a taxi fare you need



Your business card: *the quickest way to send your details is to create your own business card.*

only write T and tap the appropriate item in the list. If you enter a number, Expense automatically places it into the amount field.

Graffiti has an under-used shortcuts feature that defines an abbreviation for longer pieces of text. For example, you can set a shortcut of cc to represent conference call. Then you only need to enter the special Graffiti shortcut character followed by the shortcut label of cc and conference call should appear. To create your own shortcuts, open the Shortcuts panel in the Prefs application.

WordComplete is another application that can greatly increase your data entry speed. It offers a look-ahead list of partial matches based on the characters you've already entered. You can select a word from the list or enter more characters to refine your lookup. WordComplete also allows you to create your own custom dictionary.

Graffiti can be frustrating if you have to enter a mixture of upper and lower case letters — constantly drawing the caps stroke quickly becomes tedious. The solution are utilities that let you write characters on either side of the input panel's alpha-numeric separator line. On the left side they're entered as lower case, on the right (numeric) side they're uppercase. For devices running OS 4.x or below, try MiddleCapsHack (this requires HackMaster or other hack management software). For OS 5.x, try CrossingOver.

EVERYTHING AT A GLANCE

Instead of flicking between the DateBook, To Do list and other applications, it sometimes helps to have an integrated view of all your activities shown on a single "big picture" screen. There are several applications to do this, and all of them can be set as the default screen to appear whenever you turn on your Palm.

TealGlance provides a pop-up window with current appointment and to-do items, along with time, date and battery information. TealGlance is a "hack", so you'll need a hack manager to run it.

Wassup is a full screen application that adds emails and SMS messages to the all-in-one view, along with the ability to create new appointments and tasks. It also has a configurable launchpad for your favourite applications.

Facer provides a similar overview of your appointments and to-do tasks, along with application links and a full-blown launcher, making it a potential replacement for the standard Palm launcher.

BEAMING DATA

One of the most common pieces of data sent between Palm devices via the built-in infra-red port is a personal address book record — your "digital business card". If you haven't already created this card, you can do so by entering your business contact details (but not your home address or personal phone number) into the address book, then opening that record and choosing Select Business Card from the Record menu.

Once that's done you'll be able to beam your business card to a fellow Palm user by holding down the Address book hardware button for about two seconds, no matter what application you're in.

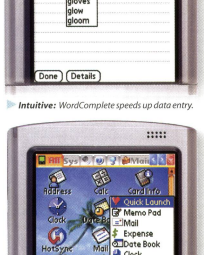
When it comes to sending other data (ranging from appointments to entire applications, provided they support beaming) there's a little-known shortcut that alleviates the "where's the beam menu?" hassle when you're in the middle of a beam-fest.

Buried deep inside the system's Prefs application is a setting for what's known as the Ronamatic stroke — a long vertical stroke from the Graffiti area to the top of the screen (it's called Ronamatic after the Palm programmer, named Ron, who added this feature to the OS). This stroke can be set up to do a number of different things, one of which is to activate beaming for the selected piece of data.

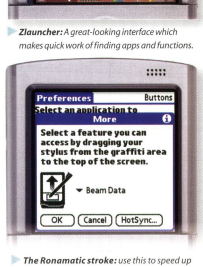
To turn this feature on, go to the Prefs application and select the Buttons option. Tapping the Pen or More (depending on your OS version) button lets you specify the default action for the Ronamatic stroke, which in this case will be Beam Data. Now you'll be able to perform a quick swipe up the screen to beam applications and other data from your device.

Beaming individual records is fine, but what if you want to send a series of items, such as Memos? Most standard Palm applications use categories as a rudimentary filing system, and these applications also allow you to send the entire contents of a category to another device. To do this, use the Send Category option found under the Record menu.

The only caveat with this is that the new records will be placed in the Unfiled category on the receiving device. If you'd like to file away records en masse you can re-categorise multiple records with a couple of taps with Mass Transit.



Intuitive: *WordComplete speeds up data entry.*



Zlauncher: *A great-looking interface which makes quick work of finding apps and functions.*



The Ronamatic stroke: *use this to speed up your beam response time.*

Extending your Wi-Fi range

***Jason Jordan* reveals how to boost the range of your wireless network without spending big on high-powered hardware.**

While wireless networks free you from the cost and clutter of cables, you can't avoid the virtual leash of the signal's limited range. A simple Wi-Fi setup will usually cover compact dwellings, such as an apartment or townhouse, but many family-sized homes are dotted with black spots, especially outdoors. Boosting signal strength not only extends the network's reach, it can also lift the throughput to the practical maximum rate.

With the right techniques you can cast the signal even further — across the road, down the street or even spanning several suburbs — creating a point-to-point connection for file sharing and gaming.



Recycled: *an old pay TV antenna is a cheap way to increase your signal strength.*

WIRELESS 101

Much of the terminology used in wireless networking relates to radio theory. This is extremely dry at best, but there are some terms you'll need to understand.

- dB (decibel) describes the effect a device has on signal strength. It's a logarithmic (not linear) scale where every additional 3dB doubles the signal strength.
- dBm (dB milliwatt) is a measure of signal strength. 0dBm is 1mW of power. Smaller signals are described as negative numbers (for example, -75dBm). 30mW is the typical output of an 802.11b wireless card, and is equal to 15dBm.
- dBi (dB isotropic) is the "gain" that a directional antenna has over one that transmits equally in all directions. While a completely omni-directional antenna doesn't exist in reality, it's a useful reference measure for designing, building and comparing aerials.

The typical power output of a Wi-Fi access point is a meager 30mW, which is good for up to 300 metres under line of sight conditions, but add a few walls and an assortment of building materials and it can be difficult to get beyond 15 metres indoors. Without an external antenna, the signal will be lucky to get to the other side of your house. The reason these figures are important is that the smart way to increase wireless range is by boosting the effective signal strength.

TIGHTEN YOUR BEAM

There's no need to spend upwards of $700 on wireless bridges, which repeat a Wi-Fi signal much like a TV or radio translator station, or special signal amplifiers. Instead, you can use efficient antenna designs to focus the wireless signal into a beam. This also reduces the risk of someone outside that beam path hacking into your network.

There are hundreds of antenna designs on the Web, ranging from the very easy to the extremely complex. However, there are a few that are tried and tested and perform extremely well for minimal effort.

A uniquely Australian method is to use the antennae from defunct pay TV operator Galaxy. They're perfect for wireless networking, and former Galaxy customers will probably let you take them away for free if you ask nicely. Martin Pot's Web page (**http://martybugs.net/wireless/conifermods.cgi**) contains easy-to-follow instructions for making the necessary changes to convert a Galaxy TV dish into an 802.11b antenna. For around $20 worth of parts and three hours of work, you'll end up with an 18–24dBi parabolic grid antenna — an effective boost of six to eight times the access point's signal strength.

Another variation is at **www.mrx.com.au/wireless/conifermodifications.htm**, which simply cuts away part of the existing hardware inside the aerial's nose cone.

Then there are those famous conversions of Pringles cans and cake tins, which use the same basic "Yagi" antenna design as the average TV aerial. These may only be good for 12dBi, but keep in mind that the built-in antenna on a PC Card is usually only 3dBi, and the short omni-directional whips on most access points are lucky to be 6dBi — so a quick and dirty Yagi array will still give you a 2x or 4x gain in signal strength.

Rob Flickenger gives detailed instructions on how to re-purpose an empty Pringles container at **www.oreillynet.com/cs/weblog/view/wlg/448**, while Andrew Clapp has done a great deal of work on this same topic at **www.netscum.com/~clapp/wireless.html**.

Martti Palomaki reports that a "cake dish antenna" is good for 14dBi, which is excellent for such a low-profile unit. His plans are at **www.saunalahti.fi/~elepal/antenna1.html**.

There are also designs that slide over an access point's own aerial. The first (at **http://osiris.urbanna.net/antenna_designs/projects/template**) requires a bit of craftwork and parts you may need to source from the local hardware store, but the second design (**http://osiris.urbanna.net/antenna_designs/projects/template2**) is as simple as printing out two sheets of paper, gluing on some tinfoil, and cutting and folding it into shape.

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EVERYTHING CONNECTED

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A collection of utilities for speeding up your Pocket PC.

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Put a **rocket** in your **pocket**

***Jenneth Orantia* shares her favourite tricks for getting things done faster and more efficiently on the Pocket PC.**

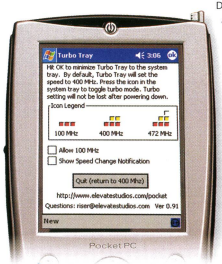
PUMP UP THE PROCESSOR

One of the most noticeable ways to pep-up your Pocket PC is by overclocking. We know it's not a technique Microsoft or the hardware vendors smile on, but overclocking generally won't fry your handheld. The worst that can happen is the device will lock up, requiring a soft reset; or the Pocket PC will hard-reset itself. So before you venture into the valley of the overclockers, back up your Pocket PC using the built-in backup utility, an ActiveSync session to your desktop, or a program like Pocket Backup (**www.spritesoftware.com**). Also, bear in mind that overclocking will dramatically reduce battery life between charges, and void the manufacturer's warranty.

There are several freeware and commercial overclocking utilities that deliver visible enhancements to the Pocket PC's performance. Files will open faster, programs will load quicker, and you can achieve much higher frame rates when watching videos or playing games.

The good news is that you may not even need to load overclocking software to squeeze a little more grunt from your handheld. Most current Pocket PCs run on Intel's XScale chips, most commonly the PXA250 and, in some higher-end models, the PXA255. These range in clock speed from 200MHz to 400MHz, but they're designed to adjust their clock speed according to the load — winding it down wherever possible to conserve power, and bumping it up for zipping through complex applications.

However, the Pocket PC OS doesn't natively support this scaling, so it requires third-party utilities. Some Pocket PCs (including the Dell Axim, ASUS MyPal and Viewsonic V35) come bundled with such a tool, where you can manually configure the speed or accept presets.



***More grunt:** overlocking considerably boosts performance.*

But if you want real overclocking — exceeding the chip's rated speed — then you'll need dedicated overclocking software. (Just be aware that not all XScale chips are manufactured equally). As a general rule, an XScale CPU shouldn't be overclocked more than 100MHz above its nominal spec, but while one 300MHz chip may stretch to 400MHz, another might struggle to reach 350MHz. So start small, with steps no larger than 20MHz at a time, until you've worked out the best stable speed that works on your device. And if you feel the handheld getting a little warmer than usual, drop the clock speed.

Turbo Tray (**http://elevatedstudios.com/pocket**) and XScaleCtrl (**www.wibble-wobble.com**) let you change the clock speeds to predefined "safe" settings. If you're not the experimental type, these programs allow you to try different speeds with a lower likelihood of locking up the device. However, if you're willing to get your hands dirty, Pocket Hack Master (**www.pockethackmaster.com**) offers the most configurable settings. It also provides downloadable device-specific profiles designed for each Pocket PC model.

The XScale Pocket PC that benefits most from overclocking is HP's iPAQ 1910: its 200MHz XScale processor is reportedly a 300MHz CPU that's been deliberately underclocked to boost battery life. ClearSpeed (**www.revolution.cx**) has been specifically designed for restoring the 1910's CPU to its speedster status; Speed Stepper (**http://elevatedstudios.com/pocket/**) is a freeware equivalent that's not as polished but provides the same basic functionality.

FASTER TEXT INPUT

One of the slowest tasks on a Pocket PC is text entry. But you can considerably boost your text input proficiency by tweaking the included input options or using an alternative keyboard.

There are a few tricks you can use to make the soft keyboard more effective, found in Start, Settings, Input. First of all, you can use Large keys instead of Small keys, reducing the likelihood of tapping the wrong letter. Additionally, use gestures for actions like Space, Backspace and Enter. Finally, configure the word completion utility, which predicts the word you're going to write based on characters you've already entered. Setting it to suggest three words instead of one increases the chances of it suggesting the correct word.

Using handwriting recognition is time-consuming, as you usually spend more time correcting text that's been badly recognised than actually writing. The Letter Shape Recognizer utility that comes with Transcriber improves the accuracy of the recognition engine by allowing you to specify how you form each alphanumeric character. Calligrapher (**www.phatware.com**) is a much-improved commercial version of Transcriber that has a number of additional features such as a spell checker, customisable dictionary and command scripts.

But if you've decided that built-in text entry options aren't for you, there's plenty of other keyboards and soft input panels you can use. The Fitaly keyboard (**www.textware.com**) boasts an alternative layout optimised for touchscreen text input and reduces stylus travel time. Spb Full Screen Keyboard (**www.softspb.com**) is a keyboard that covers the entire screen area, letting you use the screen as a virtual thumbboard. Access Panel (**www.developerone.com**) isn't quite a text entry alternative, but it lets you quickly insert chunks of predefined text into any application.



Virtual alternative: *Spb Full Screen Keyboard is cheaper than buying a hardware thumbboard.*

STARTING ANEW

There's more to handheld speed than just megahertz. There's also the number of taps it takes to do something. The fewer taps required, the faster you can complete a task.

One of the best tap-savers is New, which provides a fast and efficient way to create new appointments, tasks, contacts and documents. It lives in the bottom left-hand corner of your Today screen. Tap it once for a list of new items to create, then tap the item you want to select from the menu. You can choose which items appear in this menu by going into Start, Settings, Menus and choosing the New Menu tab.

Another tap-killing trick is to fix your most frequently used programs (or documents, or any other file type) on the Start menu, by putting shortcuts to them in the Windows/Start Menu/Programs folder.

Unfortunately, one of the many drawbacks of the Pocket PC's File Explorer is that it doesn't let you make program shortcuts. You can use the ActiveSync File Explorer when your handheld is connected to your PC, or grab a third-party file explorer like Resco Explorer 2003 (**www.resco-net.com**).

Alternatively, you can manually set the items in the Start Menu list by going into Windows/Start Menu, which is where all of the Start Menu's shortcut icons live.

HARDWARE BUTTONS

There's no reason you have to accept the default settings for your hardware buttons, which launch the calendar, contacts, tasks, inbox and voice recorder. Duck into Start, Settings, Buttons and change the button assignments to the programs you use most often. As with the Start Menu, the programs that appear in the button mapping list are all of those found in the Windows/Start Menu/Programs folder.

MORE PROGRAMS PER BUTTON

If you've got more favourite programs than your handheld has buttons, apps like DoubleLauncher (**www.orthancsoftware.com**) and Button Mapper (**www.vito-tech.com**) let you assign more than one program to each button. DoubleLauncher supports up to four programs per hardware button using a press, double press, press and hold, and double press and hold. Button Mapper lets you assign only two programs per hardware button, but has the added feature of application-specific button mapping.

PROGRAM LAUNCHERS

If you want to keep the buttons at their defaults, or have trouble keeping track of all those alternative assignments, try adding a program launcher to the Today screen. This can put a handful of programs, as well as documents and folders, right where you need them every time you turn on your Pocket PC. We recommend the great freeware program Launcher (**www.scottandmichelle.net**) and the multifunction Battery Bar 2003 (**www.omegaone.com**).

TASK SWITCHER

Although the Pocket PC lets you multitask, the taskbar doesn't show icons for each application that's running, so switching between active tasks is a cumbersome process. You can speed this up with a third-party task switcher like Wisbar (**www.pelmarinc.com**) or Icbar (**www.ictinus.com**). These freeware utilities skin the taskbar and display icons for each running task. They also let you close applications properly, unlike the close button on the standard Pocket PC taskbar which only minimises them. These minimised programs are automatically closed only when the handheld needs the memory to open other programs, but by manually closing apps using Wisbar or Icbar you can always keep your memory maximised.

READY, SET, SOFT RESET

A common complaint of Pocket PC users is the need to frequently soft reset the device. Rather than sticking the stylus into the soft reset hole each time your Pocket PC locks up, you can save yourself some time by using a utility that does it for you. Soft Reset (**www.eitcenter.com**) is a freeware program that performs this function admirably. To get to Soft Reset quickly, you can place it in the Start Menu, assign it to a hardware button or include it in a program launcher from your Today screen. EITC



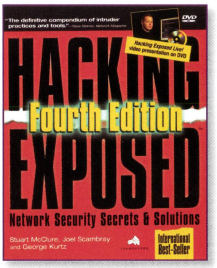
Let's begin: *use the New menu to create Outlook items and documents.*



Speeding up: *jump from one program to another using skinnable task switchers.*

Hacking Exposed

Network Security Secrets & Solutions



Now in its fourth release, and with a myriad of spin-offs, *Hacking Exposed* is one of the most popular security books of all time — and for good reason. This comprehensive title covers most that a reader could possibly use: operating systems, network devices, Web application frameworks and client software.

It's also practical. Each chapter starts with a real-life intrusion scenario, and the coverage of each vulnerability within that chapter shows how it could be exploited. Countermeasures to prevent these intrusions are then discussed. By proving these threats are real, the book shows it's necessary to defend against them. Plus, it keeps readers entertained at the same time.

This new Fourth Edition contains the usual updated list of threats, countermeasures and penetration tools, more coverage of Netware 6 and some limited coverage of Windows Server 2003.

Despite the hype, the accompanying DVD's main focus is as a promotional tool for the author's live security seminars, with only 15 minutes of footage.

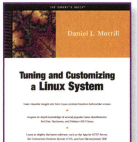
That's not the only flaw — the book has a habit of focusing on external attacks, which represent only a portion of threats to information security. More information on crafting corporate security policies would be good to help build an organisation-wide approach to threats.

Despite this, *Hacking Exposed* is still practical, entertaining and quite good value compared to other security books.

Mike MacCana

Publisher *McGraw Hill*
Price *$81.77*
ISBN *0072227427V*

Tuning and Customizing a Linux System



This title is disappointing. The book is addressed to an audience that doesn't exist. The readers who need to understand what Linux is aren't the same kind that want to compile OpenSSH from source. There's far too much coverage of the different ways to do things on varying Linux distributions, rather than focusing on Linux Standards Base methods.

It isn't about optimising Linux systems. Instead, it's a guide to almost everything the author knows about Linux — the distributions he's tried, the differences between them and the kinds of things he does with them.

Publisher *Apress*
Price *$95.00*
ISBN *1893115275*

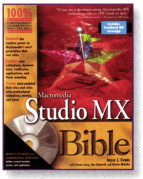
In between all this you'll find content on Apache, DNS, DHCP, Firewalling / NAT, Syslog, and CVS but often not enough to provide any real practical use. Instead, useful Web sites are mentioned. There's no information on setting up other popular network services, such as File and Print Sharing, FTP, WebDAV, NIS Serving, or VPNs.

The firewall tutorial doesn't show how packets move through the different chains, and the guide to making a custom kernel fails to explain how to build one. At the same time, there's extensive coverage of odd topics like installing Java classes and dealing with bugs in Borland's Jbuilder install.

The book tells readers too much about what they don't need to know and too little about what they do. It should have focused more on practical needs and less on the author's own preferences.

Mike MacCana

Macromedia Studio MX Bible



A monumental effort for a single book, *Macromedia Studio MX Bible* covers FreeHand (version 10), Fireworks MX, Flash MX, Dreamweaver MX and ColdFusion MX.

The FreeHand coverage is very comprehensive, with extra attention paid to animation and printing. The Fireworks chapters are thorough, but slightly sketchy on the more advanced features, such as navigation elements and menus.

The Flash section on covers all the basics, such as tweening, motion paths, symbols, libraries, making buttons and adding sound. Unfortunately, it rarely strays into any advanced territory, like working with ActionScript.

Publisher *John Wiley & Sons*
Price *$99.95*
ISBN *0764525239*

The Dreamweaver section is a methodical introduction to the basics — working with frames, templates, HTML tables, menus and integration with Fireworks and Flash files. There is even good coverage of advanced features, like behaviours, DHTML and custom scripts.

The chapters on ColdFusion are almost an extension to the Dreamweaver section, with a step-by-step explanation of how to build database-driven Web sites. Everything from form validation to custom tags is covered, including an excellent overview of developing dynamic Flash content with ColdFusion pages.

Overall, this is a top notch introduction to the entire MX suite.

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PC

Grand Theft Auto: Vice City



Gangster wrap: *Don Corleone meets Don Johnson.*

What do you get when the decade that style forgot runs into the hugely successful Grand Theft Auto series? *Justin Kranzl* welcomes you to Vice City.

Any gamer hoping to forget the sartorial minefield of the Duran Duran era is in for a rude awakening with Grand Theft Auto: Vice City. The game is set firmly in the 1980s, the time of *Manhunter*, moonwalking, and a seemingly bottomless well of Florida-themed TV. But forget about multiplayer gaming for the time being. Developer Rockstar North claims it won't support online play in the GTA world until it finds a killer model.

Any fears that the visual content could undermine the story are short lived, courtesy of a menacing mob plotline. When gangster Tommy Vercetti sets up shop in Vice City after a 15-year jolt in prison, cash flow troubles soon ensue. Playing as Vercetti, it's your goal to make your way through the story via a series of missions. The beauty of Vice City — as in the prequel, Grand Theft Auto III — is that the missions tie very closely to the storyline. You won't be asking yourself "How does this relate to the story?", but rather be bending your mind towards solving the current issue.

Grand Theft Auto III was a groundbreaking game, but by the time it hit the PC it was yesterday's news. The same criticism cannot be levelled at the sequel. Rockstar North takes pride in having rebuilt the PC version from the ground up. And yet it doesn't require a killer PC to run if lesser-endowed pixel pushers are willing to compromise on graphical quality.

The wider scope and increased difficulty of Vice City also means that it's literally no walk in the park. Players are now able to explore inside and on top of buildings, as well as at street level. It all adds to making the GTA world that much more realistic.

The same approach has been applied to transportation. Forget travelling via car or on foot 90% of the time. Vice City requires you to make frequent use of boats, motorcycles, even aircraft — including helicopters. The handling of each of the vehicles isn't simulator class, but is authentic enough to entice players to spend hours perfecting the nuances.

Players also have to master a wider array of weapons than before, and a lot more flexibility has been introduced in the way they do this.

A class-based weapons system means Vercetti can hold only one of each type. The aiming mechanism in combat still requires work, although the ability to pull drive-bys while riding your chopper is a handsome compensation.

Special mention has to be made of the use of sound in Vice City. Like GTA III, a lot of effort has been made in producing multiple in-game "radio stations", complete with music of the decade and radio announcers of varying inanity. Top-drawer talent has been employed in the character voices as well, with Ray Liotta (of *Goodfellas* fame) taking the lead as Vercetti.

Vice City on PC is an excellent title in its own right — and not just a straight port from PlayStation2. It pushes an already outstanding game to new heights. As for multiplayer, there's always next time.

Online *www.rockstargames.com/grandtheftautovicecity/pc*
Price *$99.95*
Verdict ●●●●●

PC

V8 Supercar Race Driver

Think racing games have lost the plot? Codemasters agreed, and put one in its new title.

Narrative has never been a critical component of racing games. The story usually begins in qualifying and ends either in glory on the podium or watching the replay to see what went wrong. With V8 Supercar Race Driver (V8 SRD), Codemasters flipped the script. A robust storyline in career mode serves as the backbone of the game and provides a refreshing level of dramatic tension to the pre-race build up.

Players take the role of ambitious young driver Ryan McKane — who is heavily inspired by Tom Cruise's Cole Trickle from *Days of Thunder*. Despite the similarity, it's harder to warm to McKane than Cruise, highlighting what a challenge it is to offer a playable, interactive game and meaningful character development.

There simply isn't enough time to flesh out McKane in the collection of cut scenes where he relates to other characters. Instead of coming across as engagingly confident, as the developers probably intended, the character is smug and arrogant .

This doesn't stop Codemasters from telling a good yarn in V8 SRD. While the storyline is linear, the first time players progress will be a pleasant surprise, as McKane is forced to deal not only with a multitude of different types of vehicles on the track, but also with the personalities off it. Perhaps the best compliment that can be paid is that the desire to win and see where the story goes prevails over the urge to wipe the smirk off McKane's face by engaging in multiple pile ups.

In terms of video performance against overall quality, this game is an excellent benchmark. NASCAR 2003 Racing Season may look better when set to full detail, but it places much higher demands on hardware. For some reason (most likely to boost frames per second), your car doesn't have the luxury of a rear view mirror. In tight situations — especially racing in multiplayer — this is a glaring omission.

However, the attention to detail with car parts is excellent. A proper damage model means that careless driving often results in your car losing bodywork. The game "remembers" where your debris lies, so the next time you pass you can reminisce about the cost of replacing that bumper bar. Moreover, the field-of-view angle has been subtly tweaked to increase the sensation of speed. The attendant skewing of object detail on the periphery is initially slightly off-putting, but the extra speed is worth it.

V8 SRD goes at a cracking pace. The demand for quick reflexes is paramount — reaction times are quite demanding when compared to other driving games. It's all too easy to overshoot corners in an effort to out-brake the opposition. This gives rise to one of the game's few faults — the controls, particularly steering wheels, are sensitive and twitchy. You're driving cars with prodigious amounts of horsepower that aren't the most nimble on the tarmac, yet they feel light and unstable.

This might be excused by console gamers playing the original PlayStation 2 version, but hardened PC sim racers may find things too sensitive.



Holden vs Ford: *race on Bathurst's famous Mount Panorama circuit.*

And going off the track is not penalised enough. If you slide onto the grass, you don't go into a deadly spin. You simply continue on your way until you rejoin the track, and the traction differential between the track and the green is too minimal.

For a skilled player, this equates to little or no punishment for stuffing a corner or an overtaking manoeuvre, and reduces the incentive to perfect and memorise a track's layout. Throw in AI drivers who make Travis Bickle look sedate, and you have a racing experience that is fun in a smash-em up derby way, but doesn't have the feel of its more serious competitors.

In addition to the main career mode, Codemasters equipped the game with multiplayer, test race and single racing options. Extra features are always welcome, but more time should have been spent refining the control and driving models.

As it stands, there are superior online racing alternatives whether you're a sim racer or merely after an arcade-style bash with some mates.

On the strength of its innovative plot-based approach, vast array of car types and wide-ranging track selection — with a host of Australian circuits, including Bathurst — V8 SRD rates as an impressive product, but more time spent tweaking the PC version would have made it even better.

Online *www.codemasters.com/v8racedriver*
Price *$89.95*
Verdict ●●●●○



Pile up: *you can damage the cars, but not the smug protagonist.*

Next month...

In the August issue of apc



Notebook megatest

In the market for a notebook? Then don't go shopping without next month's *APC*, because we'll test everything from nimble subnotebooks, to mid-range workhorses and mighty desktop slayers, along with the latest crop of Tablet PCs.

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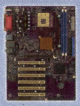
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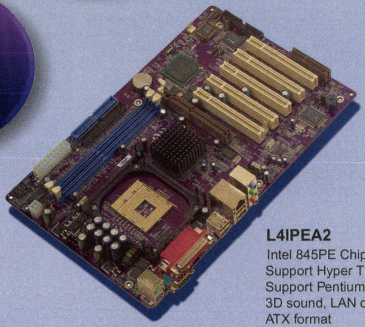
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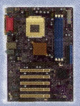
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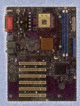
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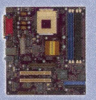
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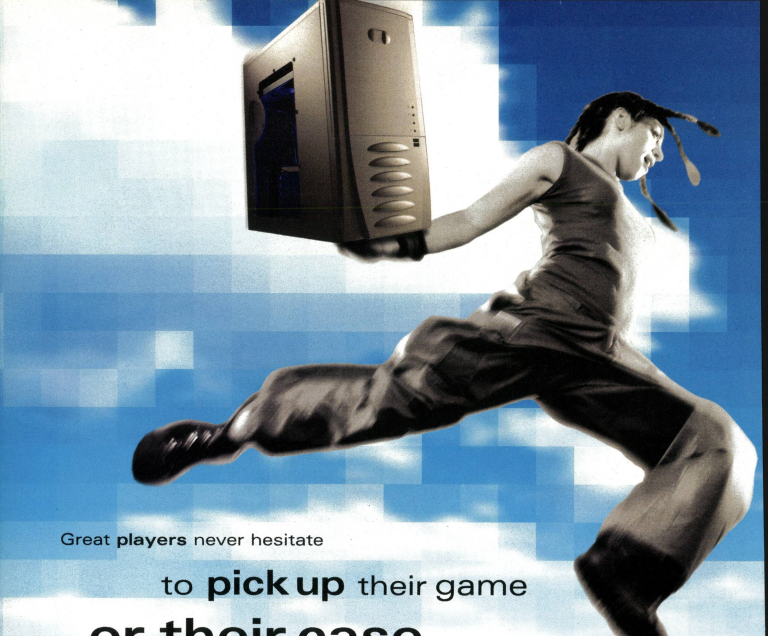


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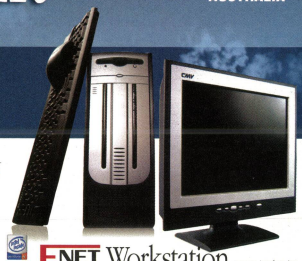
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CANON BJC-3000/6000/8000 Series	12	46-BKL
HP Desk Jet 400/500 Series	6	8A-BKL
HP Desk Jet 600/660/690 Series	6	8B-BKL
HP Desk Jet 700/800/900/1000 Series	8	29-BKL
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EPSON Stylus 400/800/800+/1000	8	1-BKL
EPSON Stylus Colour /PRO/XL	12	2-BKL
EPSON Stylus 820/colour II/IIs	12	23-BKL
EPSON Stylus Colour 200/300/400/500/600/800/850/1520	12	33A-BKL
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EPSON Stylus 820/colour II/IIs	3x12	24-CLR
EPSON Stylus Colour 200/300/400/500/600/800/850/1520	3x12	34A-CLR
EPSON Stylus Colour 440/460/480/640/660/700/740/760/900	3x12	34B-CLR
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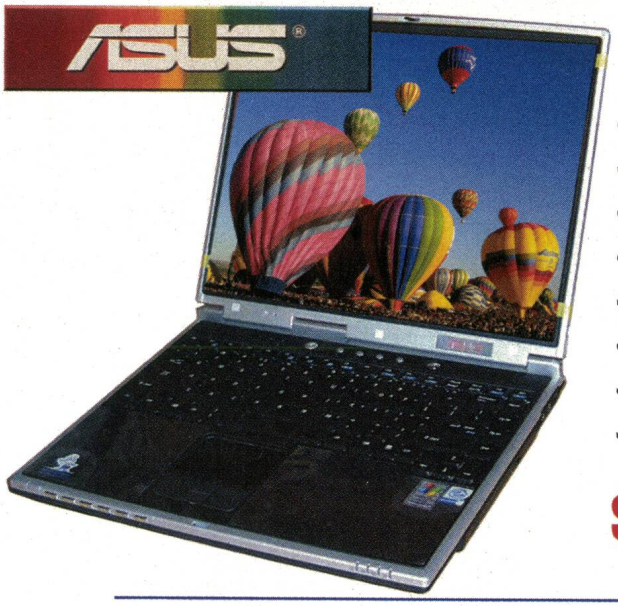
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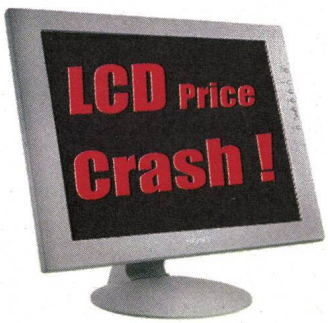


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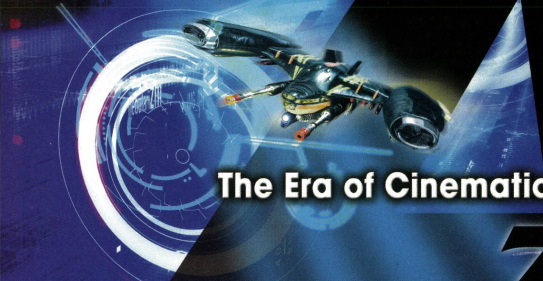
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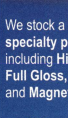
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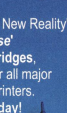


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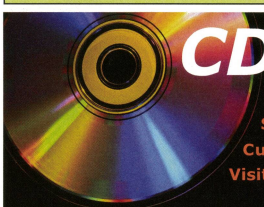
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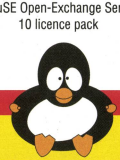
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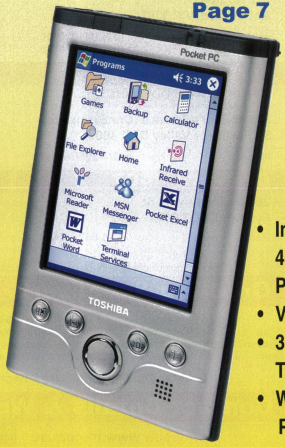
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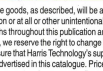
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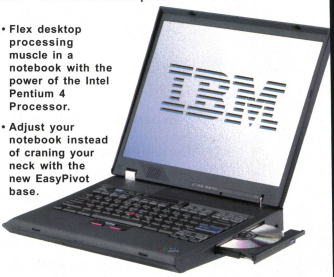
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P SYSTEM	Windows® XP Pro	Windows® XP Pro	Windows® XP Pro
ART NUMBER	(J4975)	(J4976)	(J4977)

All new range - Call for pricing

The award-winning series of Satellite notebook PC's offer the ideal balance in affordability and performance. Every Satellite is built with the right mix of features to help you power through your day-to-day computing requirements.

New stylish A Series is now only 2.8kg.

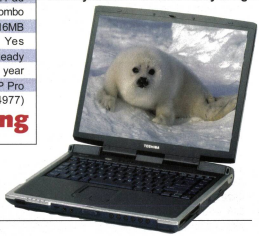


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Delivery charges extra

Universal AC Adapter (D1556) **$60**

Dobby Oxford Carry Case (C5388) **$70**

Targus USB Mobile Replicator (B4533) **$175**

HARRIS TECHNOLOGY

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S30/T50 Projectors

2 year warranty & 3 month hot swap warranty

ith a sleek compact design and lightweight at nly 2.2 kilograms, the Toshiba T50 and S30 ata projectors are the ideal companion for obile users who demand quality images nd portability at a low price.

ltra portable • Light and compact at only 2 kilograms making it easy to carry from one resentation to the next.

he power of LCD • A dazzling 1,400 ANSI mens ensures outstanding output from data or deo and a crisp, clear image even in daytime.

ltra quiet 35dB • Quiet operating design mploying an efficient heat-reducing fan with a echanism that reduces noise • Power save ode enables extended lamp life.

peedy set up • 'Plug and project' functionality nsures that even a novice will have the projector p and running in seconds • Automatic keystone orrection guarantees a perfect picture at up to 15 degree angle • Can be mounted for ermanent installation.



Projectors	S30	T50
ANSI	1400	1400
WEIGHT	2.2Kg	2.2Kg
RESOLUTION	SVGA	XGA
Rent*	$33.73/wk	$46.12/wk
PART NUMBER	(G8800)	(G6688)
PRICE	**$3,399**	**$4,998**

NO FURTHER DISCOUNTS AVAILABLE ON...

ALL TOSHIBA NOTEBOOKS AND ACCESSORIES SOLD FROM HARRIS TECHNOLOGY

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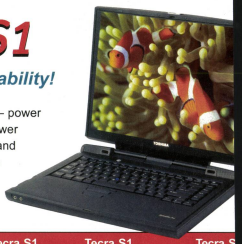
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TE-2100® + Tecra S1

Exceptional performance with wireless capability!



The TE-2100® + Tecra S1 series give you the best of both worlds — power and affordability. Built with just the right mix of features to let you power through day-to-day computing tasks with ease. Colourful displays and powerful processors provide plenty of CPU horsepower to even the most demanding applications, while the integrated multimedia devices never leave functionality behind.

TECRA Accessories

Toshiba Carry Case (C5388) **$70**

Toshiba Port Replicator (H9764) **$226**

256MB DDR Memory (E4583) **$163**

Toshiba Air & Auto Adapter (F1207) **$236**

SPECS	TE-2100	TE-2100	Tecra S1	Tecra S1	Tecra S
PROCESSOR	2.0GHz P4-M	2.2GHz P4-M	-	-	
MOBILE PENTIUM M	-	-	1.4GHz	1.5GHz	1.6GH
RAM STD	256MB	256MB	256MB	256MB	2x256M
HARD DRIVE	40GB	40GB	40GB (5400rpm)	60GB (5400rpm)	60GB (5400rpm
SCREEN	14.1" TFT	14.1" TFT	15" TFT	15" TFT	15" TF
MAX RESOLUTION	XGA	XGA	XGA	XGA	UXG
CD-ROM/DVD	DVD	DVD/CD-RW	DVD/CD-RW	DVD/CD-RW	DVD RAM-R-RW
VIDEO RAM	16MB	16MB	32MB	32MB	32M
56K v.90 & 10/100 LAN	Yes	Yes	Yes	Yes	Ye
WIRELESS LAN	Antenna	Antenna	Antenna	Antenna	Intel 802.11
WARRANTY	1 year	1 year	1 year	1 year	1 yea
OP SYSTEM	Windows® XP Pro	Windows® XP Pro	Windows® XP Pro	Windows® XP Pro	Windows® XP Pro
Rent*	$31.51/wk	$34.68/wk	$36.42/wk	$40.59/wk	$52.37/w
PART NUMBER	(H2342)	(H2343)	(H2344)	(H2345)	(H2346
PRICE	**$3,175**	**$3,495**	**$3,850**	**$4,290**	**$5,675**

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SD Media

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With up to 128MB of capacity, the small postage stamp sized SD card offers the easiest way to transfer data between devices. Fully compatible with the Toshiba Tecra® 9000 & S1, Portégé® 4000, Satellite Pro® 6100, Pocket PC, other models can accept SD memory via the PC card adapter.

32MB SD Memory Card	(E0598)	**$46**
64MB SD Memory Card	(E0600)	**$70**
128MB SD Memory Card	(E0601)	**$132**
256MB SD Memory Card	(H9139)	**$313**
PC Card SD Adaptor	(E6780)	**$155**

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ocket PC's, Portégé & Tecra

Pocket PC e350

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tel Strongarm PXA255 Xscale 300MHz
rocessor
00MHz Bus Speed
licrosoft® PocketPC 2003 operating
ystem
4MB of RAM & 16MB ROM
ltra lightweight at only 147 grams
ltra slim size: H125mm x W79mm x
12.4mm
xtra bright 3.5" Transreflective TFT screen
ong 10 hour battery life

- 72 hour data back up, when main battery is flat
- Built-in speakers & stereo headphone socket
- SD card slot for additional memory or Bluetooth SD card
- Infra-red port
- Internal jog/scroll dial for easy document & web navigation
- Microphone & record button
- USB Cradle

Rent* $7.27/wk (J4978) **$649**

Accessories

Extra Battery for E750 (G2869) **$216**

Toshiba USB Cable (F0606) **$20**

Toshiba AC Adaptor (I0312) **$30**

Pocket PC e750

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tel PXA255 400MHz Xscale
00 MHz Bus Speed
licrosoft® PocketPC 2003 Operating System
4MB of SDRAM, 32MB of Flash ROM + 32
B NAND Memory
xtra bright 3.8" Transreflective TFT screen
ecure Digital and CFII card slot
oIP Ready

- 1000mAH removable lithium ion battery
- D125mm x W80mm x H16mm
- Weight: Bluetooth 181g, Wi-Fi 185g

With Integrated Bluetooth
Rent* $14.00/wk (J4979) **$1,249**

With WiFi
Rent* $14.56/wk (J4980) **$1,299**

Portégé Series



Portégé	R-100	3500-Tablet	M Series
PROCESSOR	-	PIII 1.3GHz	
MOBILE PENTIUM M	1.6GHz	-	1.2GHz
RAM STD	256MB	256MB	256MB
HARD DRIVE	40GB	40GB	60GB
SCREEN	12.1" XGA	12.1" XGA	12.1" XGA
56K v.90 & 10/100 LAN	Yes	Yes	Yes
WIRELESS LAN	Intel 802.11b	Yes	Intel 802.11b
OPTICAL DRIVE	No	No	Combo
WEIGHT	1.2kg	1.8kg	1.9kg
OP SYSTEM	Windows® XP Pro	Windows® XP Pro	Windows® XP Pro
Rent*	$Call	$40.59/wk	$Call
PART NUMBER	(J4982)	(G4204)	(J4984)
PRICE	**$Call**	**$4,290**	**$Call**

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Tecra® NEW M1 Series

The most mobility & power without compromise!



he Tecra® series is equiped for consistant mobile performance — providing you
ith the ultimate combination of traditional Tecra® investment benefits, high
rocessor performance and a new sleek look and feel that you will notice.
ach Tecra® comes with a DVD drive as standard.

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NEC Versa P600 - Centrino



NEC VERSA P600 is housed in a glamourous and elegant chassis construct from Magnesium Alloy that gives you maximum durability without any compromise in design. NEC VERSA P600 comes with a dazzling high resolution 14" display and weighs only 2.4kg and being as thin as 27.1mm, make it definitely an ideal notebook for road warriors.

New Technological Powerful Notebook For Executive travellers who require productivity & mobility, the NEC VERSA P600 notebook features the latest In Centrino™ Mobile Technology with Mobile Intel® Pentium® M Processor, Intel® 855GM chipset and Intel® PRO/Wireless 2100 Connection that are specially tune to work together to deliver outstanding mobile performance and extended battery life.

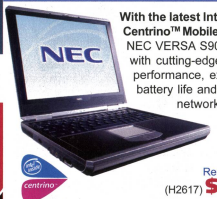
Optimized Connectivity The NEC VERSA P600 allows you constant contact with anyone anywhere in the world thanks to its built-in 56K V.92 Modem, a 10/100 LAN as well as Intel® PRO/Wireless 2100 Connection (802.11b). NEC VERSA P600 is also equipped with one IEE 1394 firewire port and three USB 2.0 ports for any high speed connection to your peripherals.

Rent* $Call

(J4675) **$Call**

• Pentium M 1.4Ghz • 14.1" • 40GB • Combo • Wireless • XP Pro

NEC Versa S900 1.5Ghz for a true mobile professional



With the latest Intel® Centrino™ Mobile Technology, NEC VERSA S900 comes with cutting-edge notebook performance, extended battery life and wireless networking.

Processor	P-M 1.5GHz, 1MB Cache
Display	12" TFT XGA
RAM	256MB (1024MB Max)
HDD	60GB
Optical Drive	DVD-RW
FDD	External via USB
Video RAM	32MB ATI Mobility Radeon
Touch Pad	Yes
I/O Ports	3 x USB (2.0), 1 x Firewire
Size (mm)	283x244x34.4-35.9
Weight (kg)	2.04 (with weight saver)
OS	Windows® XP Pro

Rent* $42.52/wk

(H2617) **$4,495**

Also available: NEC Versa S900 1.3Ghz

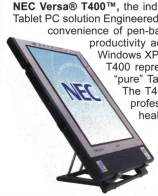


• Intel Pentium M 1.3 GHz, IMB Cache • 40GB • DVD/CD-RW Combo

Rent* $37.60/wk (H2618) **$3,975**

NEC Versa T400

NEC Versa® T400™, the industry's thinnest and lightest Tablet PC solution Engineered to combine the natural convenience of pen-based computing with the productivity advantages of Microsoft's new Windows XP Tablet PC Edition, the Versa T400 represents a new generation of "pure" Tablet-based computing solutions. The T400 is designed for grab-and-go professionals in markets like healthcare and field sales.



Processor	Intel PIII-M 933 MHz Ultra Low Voltage
Display	10.4" XGA TFT LCD
RAM	256MB SDRAM 133Mhz (512MB Max)
HDD	20GB
Optical Drive	Optional
FDD	USB optional
Size (mm)	15 mm thick
Weight (kg)	1.015kg
Ports	3 x USB 2.0, 1 x Mic-In, 1 x Audio-out, 1 x RJ45, 1 x DC-out for USB devices
Slots	1 x Type I/II CF Card Expansion
Wireless LAN	10/100 Fast Ethernet / 802.11b WiFi
OS	Windows® XP Tablet Edition

Rent* $37.79/wk

(I0321) **$3,995**

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VAIO & Clié: power & style for the mobile professional

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CGFR720
MD Athlon 2200+
5" XGA Display
VD/CD-RW Drive
0GB HDD
56MB RAM
P Home
SB 2.0



nt* $26.78/wk
(J4637) **$2,699**

PCGGRT25
- Pentium 4 2.4GHz
- 15" SXGA Display
- **DVD-RW Drive**
- 40GB HDD
- 256MB RAM
- 32MB Video Memory



Rent* $36.71/wk
(J4638) **$3,699**

PCGV505GP
NEW



- Pentium 4 2.2GHz Pentium 4-M
- 12.1" XGA Display
- DVD/CD-RW Drive
- **Integrated Wireless LAN**
- XP Pro
- 512MB RAM
- 40GB HDD

Rent* $37.83wk
(J4639) **$3,999**

PCGGRV7P
- Pentium 4 2.6GHz
- 16.1" UXGA Display
- **DVD +/- RW Drive**
- XP Pro
- 512MB RAM
- 60GB HDD
- 64MB Video Memory

Click to DVD



Rent* $55.36/wk
(H0642) **$5,999**

All VAIO models feature 56K modem, 10/100 LAN, i.LINK, USB and a full suite of multimedia software (including Photoshop Elements and Symantec Norton AntiVirus).

Mini Micro Vault



- USB2.0 Storage Device
- Compatible with USB1.1
- Plug 'n' Play
- Password lock software

USM32S
32MB RAM
(J4481)
$128

USM64S
64MB RAM
(J4482)
$159

USM128S
128MB RAM
(J4483)
$254

USM256S
256MB RAM
(J4484)
$430

PEGSJ22G
- Palm OS 4.1
- DragonBall VZ 33MHz
- 320 x 320 Colour Display
- 16MB Memory



(H9982) **$449**

CLIÉ

PEGSJ33G
- Palm OS 4.1
- Dragonball VZ 66MHz
- 320 x 320 Colour Display
- 16MB Memory
- ATRAC3/MP3 Audio Playback with earphones



Rent* $6.71/wk
(H0804) **$599**

PEGTG50G
Rent* $9.51/wk (H9981) **$849**

- Palm OS 5.0 • Intel PXA250 200MHz
- 320 x 320 Colour Display • Integrated Bluetooth™ • Integrated Keyboard with illumination • Voice Record Function • ATRAC3/MP3 Audio Playback with earphones



PEGNX70VG
- Palm® OS 5.0
- Intel PXA250 200MHz
- 320 x 480 Colour Display
- Built-in Camera
- Wireless LAN Expansion slot
- Integrated Keyboard
- Voice Record Function
- ATRAC3/MP3 Audio Playback with earphones



ent* $10.74/wk
(G3864) **$959**

PEGNZ90G
- Palm® OS 5.0
- Intel PXA250 200MHz
- 320 x 480 Display
- 2.0 Megapixel Camera
- Integrated Bluetooth™
- Wireless LAN Expansion slot
- Integrated Keyboard
- ATRAC3/MP3 Audio Playback with earphones



Rent* $19.04/wk
(H0801) **$1,699**

All Clié models feature memory stick slot, jog dial with back button and a full suite of multimedia software.

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Palm™ Zire™ 71 Handheld

Get Organised For Less!



A handheld to organise your life...
...and a camera to capture it!

Your adventures in one place...

The media-rich Palm™ Zire™ 71 handheld lets you capture pictures on the fly, listen to MP3s*, watch video clips and more – all with the ease of use you expect from Palm™. *Requires expansion card, sold separately.

- Built-in 640x480 digital camera with automatic exposure & white balance
- Listen to MP3s*, watch videos
- Outstanding 320x320 colour screen
- Breakthrough design
- Ultra-fast ARM processor
- 5-way navigator for one-handed access
- 16MB RAM
- MMC & SD expansion
- Easy to organise your life
- Palm OS 5.2.1

Zire™

* May require additional service plans and equipment

A DIGITAL CAMERA WHEN YOU NEED IT!

Just ran into an old friend and want a picture? Need quick pictures of a design idea? Simply slide the Zire™ 71 handheld open to expose the lens and its screen becomes the camera's viewfinder. Then point, shoot, click and share with friends and family. **It's that easy!**

RealOne™ Mobile Player for Palm included. Requires expansion card, sold separately. Headphones are required for stereo sound, not included.

Rent* $6.66/wk (J1936) **$595**

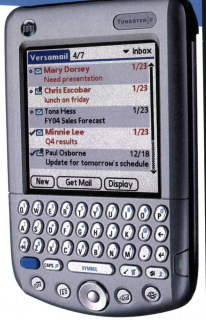
PALM Accessories

Palm Portable Keyboard (C4181) **$255**

Palm Travel Charger (C5065) **$99**

Palm 32MB SD Card (F0359) **$127**

Palm™ Tungsten C™ Handheld



Ultra Powerful Handheld with built in Wi-Fi

Supported Desktop Systems and Requirements

Expand your network with the Palm™ Tungsten™ C handheld, offering Palm's most powerful hardware ever, high-productivity software and secure 802.11b wireless LAN access to enterprise data.

- Intel® 400MHz Processor with XScale technology
- 64MB SDRAM*
- New Palm OS®
- 320 x 320 transflective TFT LCD colour display
- Built-in wireless LAN (802.11b)
- Create and edit Word, Excel and PowerPoint compatible files
- Synchronise seamlessly with Microsoft Outlook
- Proxyless web browser
- Email with attachment viewing
- Powerful and secure enterprise connectivity support including VPN
- Thumb keyboard for easy data entry and one-handed data access via the 5-way navigator
- Voice memo recorder
- View images and video clips
- Dual expandability with SD Card slot and Universal Connector

* 51 MB actual storage capacity

TUNGSTEN C

Rent* $11.15/wk (J2477) **$995**

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ORMATION TECHNOLOGY GROUP

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Reliability, stability & room to grow

The Ipex T400, powered by Intel® Pentium® 4 processor technology, is ideal for the small business user looking for a system with the performance and expansion capabilities to grow and adapt with your needs.

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Delivery charges extra

• Ipex T400 XL Altair 2.53

- Intel® Pentium® 4 processor 2.53GHz
- 256MB DDR RAM
- 60GB HDD @ 7200RPM
- CD-RW
- GeForce4 MX440 64MB with TV out
- Sound Onboard
- External Speakers
- 10/100 LAN Onboard
- USB 2.0 Onboard
- Internal 56K Modem
- Ipex Wireless Mouse & Keyboard
- 1 Year RTB Warranty
- **Microsoft® Windows® XP Home**
- OEM MS Works 7.0
- OEM Symantec NAV
- OEM Nero Burning ROM

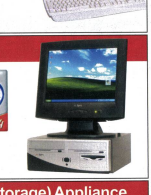


With 17" CRT Monitor
Rent* $22.40/wk (J0466) **$1,999**

With 15" TFT Monitor
Rent* $22.81/wk (J0467) **$2,299**

• Ipex T400 XL Altair 2.66

- Intel® Pentium® 4 processor 2.66GHz
- 512MB DDR RAM
- 80GB HDD @ 7200RPM
- DVD/ CD-RW Combo
- GeForce4 MX440 64MB with TV out
- Sound Onboard
- External Speakers
- 10/100 LAN Onboard
- USB 2.0 Onboard
- Internal 56K Modem
- Ipex Wireless Mouse & Keyboard
- 1 Year RTB Warranty
- **Microsoft® Windows® XP Home**
- OEM MS Works 7.0
- OEM Symantec NAV
- OEM Nero Burning ROM

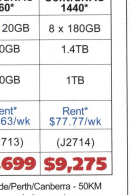


With 17" TFT Monitor
Rent* $28.77/wk (J0470) **$2,799**

With 15" TFT Monitor
Rent* $25.79/wk (J0469) **$2,499**

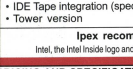
• Ipex Convergence™ XL

- Intel® Pentium® 4 processor 2.4GHz
- 256MB DDR RAM
- 40GB HDD @ 7200RPM
- CD-ROM
- Integrated Intel Extreme Graphics Onboard
- Sound Onboard
- 10/100 LAN Onboard
- USB 2.0 Onboard
- Ipex Mouse & keyboard
- 3.5" 1.44MB Floppy drive
- 3 Years RTB Warranty
- **Microsoft® Windows® XP Professional**
- OEM Symantec NAV



With 15" TFT Black Monitor
Rent* $22.40/wk (J0475) **$1,999**

• Ipex CentraNAS E8iR - NAS (Network Attached Storage) Appliance



- Slim OS and 512MB Memory
- Rack mount case with LCD Panel for setup & Status
- Web-Based Management Console
- System Monitoring and Alerts
- Dual 10/100 Ethernet Ports
- Multi-Protocol Support
- RAID 5 + Global Hot Spare
- Hot Swap Drives and cooling fans
- Data Synchronization for replication and distribution (eg. One-to-Many)
- Upgrade PCI slot for extra NIC

Optional:
- Redundant, hot swap, power supply
- CD-RW, DVD-RW integration
- IDE Tape integration (specific model)
- Tower version

MODEL	CentraNAS 320*	CentraNAS 640*	CentraNAS 960*	CentraNAS 1440*
HARD DISK (7200RPM)	8 x 40GB	8 x 80GB	8 x 120GB	8 x 180GB
RAW CAPACITY	320GB	640GB	960GB	1.4TB
CAPACITY - Raid 5 + Hot Spare Drive	240GB	480GB	720GB	1TB
RENT	Rent* $43.51/wk	Rent* $51.63/wk	Rent* $59.63/wk	Rent* $77.77/wk
PRODUCT CODE	(J2711)	(J2712)	(J2713)	(J2714)
PRICE	**$4,599**	**$5,595**	**$6,699**	**$9,275**

*Warranty 1 Year onsite (Sydney/Brisbane/Melbourne/Adelaide/Perth/Canberra - 50KM Metro) 2nd & 3rd year warranty options available as well as upgraded warranty response.

Need to configure a PC to your own needs? Call Harris Technology on 1300 13 9999

IPEX LCD MONITORS

IPEX 15" LCD



- Max Res: 1024 x 768 @ 75Hz
- Multimedia with tilt & swivel base.

Rent* $7.61/wk (CS400)
$679

IPEX 17" LCD



- Max Res: 1024 x 768 @ 75Hz, 1280 x 1024 @ 60Hz

Rent* $11.87/wk (H1959)
$1,059

Ipex recommends Microsoft® Windows® XP. All Images are for illustration purposes only

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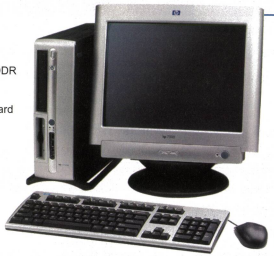
Desktop solution

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Delivery charges extra

HP compaq Evo D330 ST

- Intel® Pentium® 2.4 GHz Processor with Hyper Threading (800MHZ FSB)
- Intel® 865G Chipset
- Compact Slim Tower Chassis
- 256MB PC3200 (400MHz) Dual Channel DDR SDRAM (2 x 128MB)
- Integrated Intel Extreme Graphics 2
- 40GB 7200RPM Smart III Ultra ATA/100 Hard Disk Drive
- 48X/24X/48X CD-RW Drive
- 1.44MB Floppy
- Soundmax Digital AC97 Integrated Audio with Internal Speaker
- Integrated Broadcom NeXtreme Gigabit Ethernet
- 6 x USB 2.0 ports (2 Front, 4 Rear)
- 2 x PS/2, 1 x Serial, 1 x Parallel Ports
- USB Easy Access Keyboard
- USB Optical Scroll Mouse
- DMI 2.0 compliant
- Microsoft® Windows® XP Professional
- Norton Anti-Virus 2003



DG269A

Evo D330 ST

- P2.4GHz
- 40GB
- 256MB
- CDRW
- Win XP Pro.

Monitor not Included with Evo D330 ST Desktop

Rent* $16.24/wk (J5275) **$1,449**

Ask About... Extended Harris Warranty

HP Services Carepaq Upgrades:
Microsoft Operating System Application Telephone Support
10 Call Pack (D6479)
$1,699
25 Call Pack (D6480)
$4,285

Server solutions

Improve your business efficiency with an HP serv

HP server tc2120 Series

For businesses setting up their First Client Server Networ

- Intel® Pentium® 4 processor 2.66GHz (single processor)
- 256MB standard memory, (4GB max)
- 36GB SCSI harddrive or 40GB ATA
- Integrated single channel Ultra3 SCSI adapter or embedded dual channel ultra ATA-100 IDE Adapter
- Integrated ATI Rage XL Video Controller with 8Mb Video memory
- Up to 5 expansion slots
- 250W Power Supply



tc2120 2.66/533,256MB 40GB ATA Rent* $21.24/wk (J5323) **$1,895**

tc2120 2.66/533,256MB 36GB SCSI Rent* $23.77/wk (J5324) **$2,395**

Or purchase a server solution!
A TC2120 SCSI server that is preloaded with windows 2000 Server including 5 Licenses

tc2120 2.66/533,256MB 36GB SCSI W2K bundle Rent* $37.79/wk (J5327) **$3,995**

hp ProLiant ML330G3 Server

For businesses needing a **Branch Office dual Processor Server** to run sophisticated small business applications

- Intel® Xeon 2.4GHz or 2.8GHz processor
- 256MB standard memory (4GB max)
- NC7760 PCI Gigabit Server Adapter (embedded)
- 4PCI expansion slots
- Integrated Single Channel Wide Ultra3 SCSI Adapter in PCI Slot
- 1 year warranty



ML330G3 Xeon 2.4/533 36GB SCSI Rent* $26.74/wk (J5325) **$2,695**

ML330G3 Xeon 2.8/533 36GB SCSI Rent* $31.71/wk (J5326) **$3,195**

Optional Extras 3 year next Business day Onsite Warranty (F1130) **$270**

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Notebooks and Handheld

HP compaq nx9000 Business Notebook



- Intel Mobile Pentium 4 Processor 2.0GHz
- Bright and large 15.1" colour TFT XGA display
- Massive 40GB Hard Disk Drive
- 512MB DDR SDRAM
- 8 x DVD-ROM drive and 3.5" 1.44MB diskette drive
- Integrated 802.11b wireless LAN, 56K/v.92 modem and 10/100 Ethernet

(J5038) **$Call**

HP compaq nx9010 Business Notebook

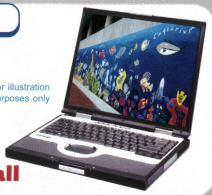


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- Intel Celeron Processor 2.0GHz
- Generous 14.1" colour TFT XGA display
- 20GB Hard Disk Drive
- 256MB DDR SDRAM
- 24 x CD-ROM drive and 3.5" 1.44MB diskette drive
- 56K/v.92 modem and 10/100 Ethernet

(J5040) **$Call**

HP iPAQ H1910 Pocket PC

HOT NEW PRICE



- 200MHz Intel® Xscale Processor
- 64MB RAM
- Small and lightweight, only 120gms
- 3.5" Transflective colour TFT display with LED backlight
- Removable/re-chargeable battery
- SD memory card slot - transfer & store pictures, data, music, and more
- Stereo earpiece
- Microsoft® Pocket PC 2002
- Docking Cradle sold seperately

(H8864)

The hp iPAQ Pocket PC h1900 combines style with robustness — merely 120g, it is unbelievably slim and incredibly light. Boasting smart features offering effortless mobility, you will be spoilt by its large transflective TFT colour screen with LED backlight, in-built SD memory card slot and slim removable/rechargeable batteries.

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Accessories

Compaq 256MB DDR SDRAM (266MHz) (F1628) **$175**

Compaq Basic Port Replicator 1.1 (J2060) **$295**

Compaq Slimline Notebook Case (C3192) **$70**

hp Auto Adapter (D9174) **$65**

hp Secure Digital (SD) Memory Card 128MB For H3800 Series (E4026) **$345**

hp Desktop Cradle (H8778) **$70**

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APC



PNote Pro (99592)

$59



Surge Arrest 5 Strip (A0098)

$69



APC Symmetra Power Array 8kVA, exp. to 16kVA (71087)

Rent*$119.96wk

$14,799

Back-UPS ES 350/500

Affordable battery backup

The new APC Back-UPS ES 350/500 is an affordable battery backup to provide continued uptime and hardware protection for home and home office. Three battery and surge, two surge only outlets, phone, modem, fax and DSL data line surge protection, computer interface port for USB communications and ships with file saving and auto-shutdown software. 2 year warranty.

IDEAL FOR:
computer & data
fax photocopier
modem internet
printer scanner



Back-UPS **ES 350va**	(E1093)	**$219**
Back-UPS **ES 500va**	(E0709)	**$275**

Back-UPS RS for Workstations

Smart battery backup & high performance surge suppression

Including additional outlet for protection of printers, audible alarms, phone/modem protection, user replaceable hot swappable batteries. PowerChute® Plus software.

IDEAL FOR:
computer & data



RS 500VA

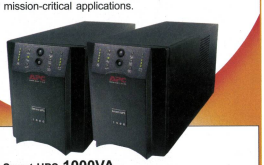
APC Back-UPS **RS 500VA**	(H2003)	**$339**
APC Back-UPS **RS 1000VA**		
Rent* $8.95/wk	(J5134)	**$799**

Smart-UPS with USB Support

Smart-UPS 1000VA, 1500VA

Smart-UPS protects your data by supplying network-grade battery backup when power fails. PowerChute® Plus software will safely store data and shut down your network operating system before the battery is fully discharged. APC Smart-UPS is the perfect UPS for fileservers, minicomputers, Internet hubs, telecom systems and other mission-critical applications.

IDEAL FOR:
computer & data



APC Smart-UPS **1000VA**		
Rent* $12.87/wk	(D9337)	**$1,149**
APC Smart-UPS **1500VA**		
Rent* $16.75/wk	(D4218)	**$1,495**

Smart-UPS Rackmount

Smart-UPS 750VA, 1000VA

APC's slim line rack-mount Smart-UPS deliver premium uninterruptible power and the most advanced performance features available. With PowerChute® plus software the uninterruptible power supply (UPS) will safely store data and shut down your network operating system before the battery is fully discharged, whether you're there or not. SmartSlot internal accessory slot allows you to install optional accessories to enhance the performance of your UPS.

IDEAL FOR:
servers



APC Smart-UPS **750VA**		
Rent* $13.73/wk	(H0659)	**$1,225**
APC Smart-UPS **1000VA**		
Rent* $17.92/wk	(H0660)	**$1,599**

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2002

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Next Generation Backup Solutions

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MEDIA

DLT Tape Media IIIXT 15/30GB Tape
(68362)
$79

DLT Tape IV Media 20/ 80GB
(71231)
$125

DLT Cleaning Tapes
(97851)
$83

Super DLT Media 110/320 GB
(B9825)
$233

LTO Ultrium 100/200 GB Tape
(D1500)
$128

1 SuperDLT Cleaning Tape
(E4874)
$199

LoaderXpress

- **DLT1, DLT8000, SuperDLT - up to 1.1TB, 10 Cartridges**
- **LTO Ultrium - up to 1.1TB, 11 Cartridges.**

The LoaderXpress is a family of autoloaders which combine the latest drive technology with field-proven and award winning robotics first introduced by Overland. This line is an excellent entry point for users who require tape automation on a modest budget. LoaderXpress products support the LATEST in tape technology.

LXL1B10T Single DLT1 Tape Drive
Rent* $79.59/wk (A0476) **$9,492**

LXLS810ST Single DLT8000 Drive
Rent* $83.66/wk (F3150) **$9,978**

LXL1S10T Single SuperDLT 220 BRC Drive
Rent* $168.13/wk (B6370) **$20,898**

LXL1U11T Single LTO Ultrium Drive
Rent* $163.80/wk (E6376) **$20,360**

PowerLoader

- **DLT1, DLT8000, SuperDLT-up to 1.7TB, 15 or 17 Cartridg**
- **1-2 drives, field-upgradeable, barcode reader standard**

Overland PowerLoaders offer a step up in capacity a performance at a minimal cost for users who may currently u a standalone tape drive or small autoloader and now need mo performance. Overland offers a series of autoloaders that c be field upgraded to two drives. The PowerLoader offers t most popular drive technologies ensuring that existing tape me archives can be read.

LXM1L117TB Single LT0 Tape Drive 17 tape capacity
Rent* $172.17/wk (H0638) **$21,400**

LXM8115TB Single DLT8000 Tape Drive 15 tape capacit
Rent* $111.58/wk (F3171) **$13,765**

LXM1S115TB Single SuperDLT 220 BRC Drive 15 tape capacity
Rent* $167.42/wk (F3175) **$20,810**

LXM2S115TB Single SuperDLT 320 BRC Drive 15 tape capacity
Rent* $181.17/wk (H9768) **$22,519**

AIT PowerLoader

- **AIT-2, AIT-3 drives – 950GB, 1900GB, 19 Cartridges plus mail slot**
- **1 or 2 drives – field-upgradeable, bar code reader standard.**



LP2L119TB Single AIT-2 Tape Drive
Rent* $121.51/wk (F3177) **$14,990**

LP3L119TB Single AIT-3 Tape Drive
Rent* $157.44/wk (F3179) **$19,569**

Neo Series 2000

- **DLT8000, SuperDLT, LTO Ultrium – up to 6TB**
- **1 or 2 drives – field–upgradeable**
- **26 (DLT8000, SDLT) or 30 (LTO) cartridges.**

The Neo series is the newest library family from Overland and provides unprecedented levels of availability through Non-St Operation, investment protection through SmartScale Architectur and flexible connectivity to direct attach or SAN environmen through Virtual Interface Architecture.



LXN2130R2UL Single LTO-2 Tape Drive
(H9769) **$32,100**

LXN2126T1SL Single SDLT220 Tape Drive
Rent* $231.70/wk (F3182) **$28,799**

LXN2126T2SL Single SDLT320 Tape Drive
(F4315) **$30,695**

LXN2130T1UL Single LTO-1 Ultrium Tape Drive
Rent* $233.11/wk (F3185) **$28,975**

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Logitech Navigator Trio is the complete communication solution for your PC. The comfortable ultra-flat cordless keyboard features enhanced function keys to simplify the things you do most often. Gain one-touch access to your QuickCam camera; easily control your multimedia experience; quickly access your files, pictures, music and the Web. The cordless optical mouse provides greater accura cy on almost any surface. The included Logitech QuickCam Messenger is an easy-to-use webcam with a built-in microphone.



(G9642) **$197**

QuickCam® Pro 4000

This premium webcam lets you express your creativity like a pro. Capture, edit and share high-quality videos, up to 1.3 megapixel photos and add video to your instant messages. 2-year warranty.



(F8835) **$227**

Cordless MX Duo™



Ultimate performance, design and control. The ultra-comfortable Cordless Elite Keyboard delivers high performance cordless freedom, maximum efficiency and innovative style. The cordless MX-700 Optical Mouse integrates a revolutionary optical sensor with fast RF cordless technology to provide corded performance - without the cord. With rechargeable batteries and a rapid charge base unit the mouse is always ready to use. 5-year warranty.

(H9665) **$197**

MX™700 Cordless Optical Mouse



MX Optical Engine responds instantly to the fastest movement. Fast RF cordless technology delivers high performance without a cord. Cruise Control enables continuous scrolling in long documents. Always ready to work with the included rapid charge station. 5-year warranty.

optical

(G2474) **$145**

Logitech® Z640 Speakers

The Logitech Z-640 is a powerful 5.1 speaker system. Wall mountable satellites and 70 Watts RMS deliver earth-shaking surround sound while the included adaptor provides instant connectivity to game consoles, TVs, DVD and CD players. The Logitech Z-640 is Dolby Digital ready when used with hardware with Dolby Digital decoding such as a PlayStation 2.

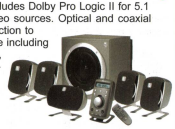


FLY BUYS 500 BONUS POINTS

(G2806) **$165**

Logitech® Z680 THX Speakers

The Logitech Z-680 THX is a 500 Watt sound system with built-in Dolby Digital and DTS hardware decoding. Advanced functionality includes Dolby Pro Logic II for 5.1 surround sound from stereo sources. Optical and coaxial inputs allow simple connection to nearly any audio appliance including PCs, TVs, game consoles, CD & DVD players. The Z-680 is all you need to turn your existing audio or video system into a home theatre. 2-year warranty.



FLY BUYS 500 BONUS POINTS

(G2817) **$749**

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Logitech

QuickCam® for Notebooks



(F3093) **$109**

USB Desktop Microphone



(H8689) **$65**

QuickCam Express



(D5894) **$85**

Elite Keyboard



(F4395) **$88**

Optical Mouse

optical



(B9948) **$45**

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Microsoft hardware

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Wireless Optical Desktop for Bluetooth

Advanced cable replacement technology



Effortless, cable-free connections.
Bluetooth compatible with selected:
- Phones
- PCs
- Printers and more

Easily connect these devices to your PC, without wires, by simply plugging in the Microsoft USB transceiver for bluetooth.

(G8808) **$345**

Wireless Optical Desktop

Discover a complete wireless solution that frees your desktop from clutter



Everything you've always wanted with a keyboard and mouse in one package - wireless freedom, stylish looks, and one-touch features. Customisable keys, optical mouse technology, cool design all-in-one desktop solution.

Keyboard Features:
Software hot keys
Mouse Features:
Optical Technology

(G4210) **$175**

Intellimouse Optical



(D4028)

$75

Multimedia Keyboard

The Multimedia Keyboard that fits your digital lifestyle



One-touch buttons take you directly to your favorite multimedia activities - navigate music and video clips, surf the Web, start the programs you use most, and more. With easy to use keys and custom blue accents, the Microsoft MultiMedia Keyboard adds dynamic features and vibrant looks to any desktop.

(G3157) **$89**

Internet Keyboard

Easy One-Touch Access to the Internet, e-mail, and more...



Familiar, durable keyboard design, customisable hot keys, and control key shortcut labels.

Benefits:
- Get fast and easy one-touch access to the web, e-mail, and your favorite applications
- Customisable hot keys for quick access to your favorite programs and web sites
- Durable, familiar keyboard design
- Detachable palm rest

(F9189) **$45**

Fortitude Valley Business Centre

NOW OPEN IN QLD!

Notebook Optical Mouse

Captures over 6000 frames per second



- Superior tracking speed translates into smooth, accurate cursor performance & works on most surfaces
- An eye-catching translucent look & wider design
- Optical Technology for smooth & accurate performance
- Scaled down in size & contoured for users comfort
- USB Connector

(G3159) **$65**

Optical Mouse Blue

The Mouse that brightens your desktop



Turn any desktop into a bright, vibrant, place. Microsoft Optica Mouse Blue includes a wider, clear scroll wheel, with a signature red optical glow, all in a fun design. Roll and scroll in style!

Benefits:
- Unique clear scroll wheel
- Fun optical glow – No mouse ball!
- Comfort for either hand
- Dazzling design

(F9311) **$55**

Intellimouse Explorer



(D3801)

$95

Wireless Intellimouse Explorer

IntelliMouse Explorer uses a new optical sensor called IntelliEye®



Experience optical technology and wireless freedom in a stylishly unique and comfortable design.

Key Features:
- Power Saving Features
- Ergonomic Design
- Enhanced Grip
- 2 Extra Buttons
- 5 Customisable Buttons
- Faster Wheel Scrolling
- USB Connector

(D0990) **$149**

Microsoft Wheel Mouse Optical

Move through documents quickly without clicking on the scroll bar



Microsoft Optical Technology replaces the old-fashioned mechanical mouse ball and works on virtually any surface.

Benefits:
- Reliable Optical Technology
- Faster wheel scrolling
- Accelerated scrolling reacts to how quickly you roll the wheel
- Designed for right or left hand

(F5129) **$45**

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Combine convenience and comfort with efficient storage for your notebook computer and mobile accessories. Stylish and lightweight, the perfect choice for weekends too.



RakGear Matrix
RG0322 (H9603)
$105



NEW

Sports Black
CZ1000 (J3709)
$119
Also available in Olive CZ1001 (C9860) & Grey CZ1002 (D0561)



NEW



Sportline Deluxe Blue
TSB315 (F0754)
$119

RakGear Slam Red
RGS013 (H0567)
$79
Also available in Silver RGS012



Sportline Silver
TSB212 (F0752)
$85
Also available in Blue TSB215

Wireless Presenter



- A wireless presentation tool for notebook computer users
- RF input device to wirelessly control presentations from up to 10 metres away.
- Integrated laser pointer and full function mouse for maximum control and flexibility during multimedia presentations.

PAUM35F (H9609) **$80**

Wireless Optical Mini Mouse



- Navigate a mouse without a wire up to 1m from a notebook or desktop computer
- Designed for mobile users - smaller and lighter than most mice
- Optical sensor

PAUM005U (F3343) **$79**

Noise Reduction Headphones



- Use on an airplane or commuting to work
- Blocks out all sources of external noise and interference
- Leather ear cushions
- Adjustable headband
- Easily folds up for travel
- Includes a carry bag

PA605U (H0568) **$148**

USB-PS/2 Optical Mini Mouse V2



- One of the world's smallest optical mice.
- No tracking ball, so it never needs cleaning!
- Can be used on any surface except glass
- Comes with a USB to PS/2 adapter

PAUM003U (G4155) **$59**

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PDA ACCESSORIES



Universal Slip Case
CHUS01 (H9604)
$12



Universal Organiser
PDAT01 (H9610)
$20

Universal Organiser Sport
PDAT05 (H9611)



$16

Universal Wireless Keyboard
PA870U (J2020)



$149



Charger Sync Cable for Toshiba
PA255U (H9138)
$44
Also available for: iPAQ 38xx
CQ295U (F9333)
$34

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22Mbps Wireless Network



DWL-1200+ D-Link AirPremier™ 22Mpbs Wireless LAN Concurrent Access Point & Bridge

- Simultaneous Operation of Access Point & Bridge function
- Fast Ethernet Port(s) to bridge Wireless LAN to Ethernet Network
- 4-Port 10/100Mpbs Switch
- Modes of operation(s): Access Point, AP Client Bridge (Point-to-Point or Point-to-Multi Point)
- Wireless Repeater Operation Function

DWL-1200+

Rent* $10.03/wk (J2429) **$895**

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High Quality Video Conferencing for Home and Office

i2eye

DVC-1000 VideoPhone

The D-Link DVC-1000 i2eyeTM VideoPhone introduces the world of video conferencing over the Internet, to bring you and your family, friends and colleagues together. Since the DVC-1000 i2Eye VideoPhone is a stand-alone device, you do not need a computer to video conference over the Internet.Connect a standard telephone and a television to the DVC-1000, plug in a standard Ethernet network cable connected to your broadband Internet connection and you are ready to conduct real-time video conferencing. Compatible with Net Meeting or any product that supports Net Meeting.



Rent* $9.69/wk (H2334) **$865**

Network Switches

DES-3226S
24 Port 10/100Mbps Managed Layer 2 stackable switch, with optional Gigabit & Fibre.



Rent* $16.57/wk (F9634) **$1,479**

DGS-1008T
8 Port Gigabit Copper Ethernet Switch.



Rent* $11.19/wk (D9338) **$999**

DGS-1024T
24 Port Gigabit Copper Ethernet Switch with 2 Mini GBIC expansion slots.



Rent* $36.07/wk (G1968) **$3,290**

Ask About...

EXTENDED HARRIS TECHNOLOGY WARRANTY

- ☐ Extend to a total of 3 Years Return to Base
- ☐ Extend to a total of 5 Years Return to Base
- ☐ Upgrade Return to Base of Warranty Extension to On-Site

AirPlus Xtreme G™ 11/54Mbps Wireless Solutions

AirPlus XTREME G

New series of high-speed devices capable of transfer rates up to 54Mbps. And with the new AirPlus Xtreme G DWL-2000AP Wireless Access Point, D-Link once again sets a new standard for wireless access points.
It includes an embedded DHCP server that once enabled will automatically assign IP addresses to wireless clients. This unique feature makes the DWL-2000AP an ideal solution for quickly creating and extending a wireless local area network (WLAN) in offices or other workplaces, or even at trade shows and other special events.



DWL-G520
Wireless PCI adapter
(H9622) **$169**



DWL-G650
Wireless PCMCIA cardbus
(H9621) **$139**



DWL-2000AP
Wireless Access Point
(H9623) **$320**

DI-624



NEW

(J4539)
$339

The DI-624 features the very latest in advanced wireless silicon chip technology including enhanced security to shield and protect your wireless communication from intruders. It also includes D-Link's own robust firewall security features. The DI-624 is ideal for those creating their first wireless network, as well as for more advanced users looking for additional management settings and policy-based content filtering. Filters can be set based on MAC address, IP address, URL and/or Domain Name.

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D-Link®

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Products on Promotion

22Mbps Wireless Network - AirPlus on Promo

FANTASTIC PRICING

DWL-650+
AirPlus™ 22 Mbps Wireless LAN PCMCIA adapter



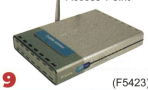
(F5422) **$95**

DWL-520+
AirPlus™ 22 MbpsWireless LAN PCI Adapter



(F5421) **$119**

DWL-900AP+
AirPlus™ 22 Mbps Wireless LAN Access Point



(F5423) **$229**

AirPlus

Not all items are in stock at all stores but can be ordered for Pick-up or Delivery

Delivery charges extra

IT & T AWARDS RESELLER OF THE YEAR 2002

Cable & DSL Routers/Gateways & Modems

DI-614+
AirPlus 22Mbps Wireless Internet Gateway.
Ideal networking solution for SOHO & other small business catering to public useage

- DSL/ Cable Modem
- Router
- 22Mbps Wireless Access Point
- 4 Port 10/100 Switch



(G0229) **$239**

DI-704P
IP Router for DSL/ Cable Modems with 4 Port Switch & Single Port Print Server

Built-in Bigpond Cable Login



(E5861) **$159**

RENTSMART

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DI-707P IP Router for DSL/Cable Modems with 7 Port Switch & Single Port Print Server

Built-in Bigpond Cable Login



(E7329) **$229**

DI-714P+ 22Mbps Wireless IP Router for DSL/Cable Modems with 4 Port Switch & Single Port Print Server



(G9644) **$379**

FLY BUYS 1,000 BONUS POINTS

Collect 1000 Bonus Fly Buys points when you purchase G8729 between 20/06/03-31/07/03



DSL-302G USB/Ethernet Combo ADSL Modem - with NAT + DHCP

DSL-302G (J2428) **$229**

DI-764 11/22/54Mbps Wireless IP Router for DSL/Cable Modems with 4-Port Switch

DI-764 Rent* $10.25/wk (G9645) **$899**



DSL-604+
The DSL-604+ Wireless ADSL Router is a versatile all-in-one networking device that provides high-speed broadband Internet connection, wireless user access and dedicated LAN bandwidth server connection.

FLY BUYS 1,000 BONUS POINTS



(G8729) **$499**

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AUSTRALIA CONNECTS WITH NetComm®

20 years

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Web Direct www.ht.com.au/cat/netcomm

High Speed Internet Access

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Delivery charges extra

IT & T AWARDS RESELLER OF THE YEAR 2002

Web Direct

See Web Direct Link (at top of page) for more products and latest info!

Fyshwick Business Centre NOW OPEN IN ACT!

ADSL Modems with NetComm

NB1300 ADSL Ethernet Modem Router

High speed ADSL modem with both Ethernet & USB connectivity.
Approved for connection to Telstra's ADSL network.



(G4025) **$199**

NB1200 ADSL USB Modem

High Speed ADSL modem with USB connectivity.
Approved for connection to Telstra's ADSL network.



(F8602) **$149**

NB3300 ADSL Modem / Router / 4-port switch

Integrated ADSL modem and router with 4 port 10/100 switch.

- Easy web interface
- NAT security and internet sharing
- Supports PPPoA, PPPoE, PPTP



(F3590) **$399**

NetComm Cable / DSL Routers

NB2800 Cable / ADSL Router / 4-port switch

- Built-in DHCP server
- NAT firewall protection
- VPN pass-through
- Quick & easy to install



(H2086) **$169**

NB3000 Cable / DSL Wireless Router / 4-port switch

- 4-port 10/100 switch
- NAT firewall protection
- Wireless range up to 90 metres indoors!
- Works with major Australian ISP's - Cable, DSL.

Wireless speeds and range may vary depending on locations.



(F3588) **$299**

NB3100 Compact (ASL Cable Firewall Router)

NEW

- SPI (Stateful Packet Inspection)
- Supports Denial of Service Preventions and URL filtering
- Can block all Java, ActiveX code and cookies
- IPSec and PTP pass-through
- Supports up to 2 simultaneous VPN tunnells
- 4-port 10/100 switch
- UpnP (Universal Plug & Play)
- Diagnostics (Ping & Trace Route)
- Back up & Restore Configuration



(J4636) **$279**

NB3200 Cable / DSL VPN Router 4-port switch

- Provides full IPSec VPN tunnelling and NAT firewall protection
- Supports up to 70 simultaneous VPN tunnels
- 4-port 10/100 switch
- Easy web interface



(F3586) **$395**

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Wireless Networking

NetComm 802.11b Wireless Networking

NP6800 Wireless Access Point

NetComm 11Mbps Wireless LAN Access Point

- Flexible integration for Infrastructure, Client, Point & MultiPoint Bridge modes
- Security with the latest 128-bit WEP encryption
- Auto fallback = optimised reliability, throughput and transmission range.



HOT PRICE

(H2189) **$169**

NP7032 Wireless PC Card

Provides high speed wireless networking and secure access to network resources and the internet.



HOT PRICE

(H2060) **$69**

NP7042 Wireless USB Adaptor

Provides high speed wireless Internet access and networking for USB-enabled desktop PCs or notebooks.



HOT PRICE

(H2064) **$99**

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Delivery charges extra

NetComm Ethernet Switches and Gigabit Solutions

NP3640 Fast Ethernet Mini Print Server

(J4656) **$209**

Sharing your printer with others on your 10/100 Ethernet network has never been easier than with the NetComm NP3640 Mini Print Server. Fully 10/100 compliant and compatible with most parallel port printers this versatile print server supports 5 major protocols; TCT/IP, NetBEUI, IPX/SPX, SMB and AppleTalk.



NEW

NP2005
5 port 10/100 auto-sensing switch



(D0966) **$99**

NP2008
8 port 10/100 auto-sensing switch

(D0967) **$119**

NP2160
16 port 10/100 auto-sensing professional switch (19-inch rack-mount kit)



(E7322) **$395**

NP2240
24 port 10/100 auto-sensing professional switch (19-inch rack-mount kit)



(E7323) **$489**

NP2480
26 port 10/100 Gigabit switch, 24 10/100Mbps auto-sensing and 2 1000Base-SX Copper Gigabit Ethernet Port (19-inch rack-mount kit)



Rent* $16.70/wk

(F9533) **$1,490**

NETCOMM Print Servers



NP5300PS
10/100Mbps print server, 3 parallel ports.

(92346) **$398**

NetComm Fast Ethernet Adaptors

NP1100
High performance 32-bit 10/100 PCI LAN Adapter



(C7657) **$19**

NP1200
10/100 Fast Ethernet 32-bit PCCard



(D1166) **$99**

NP1010
USB LAN Key 10/100 Fast Ethernet Adaptor



(C7651) **$68**

NP1300
Connect your PDA to your LAN. 10base-T Compact Flash LAN Adaptor. Comes with PCMCIA adaptor for use in notebooks.



(D4201) **$129**

NP1800
32-bit PCI Gigabit Network Card

Gigabit N.I.C



(G6483) **$114**

NP1500
Enhanced 32-bit **Intel** based 10/100Mbps network card specifically developed with business users in mind.

INTEL



(G6482) **$95**

NP1880
32/64-bit PCI Gigabit Network Card RRP $199

Gigabit N.I.C



(G6484) **$169**

Ask About...

EXTENDED WARRANTY

- ☐ Extend to a total of 3 Years Return to Base
- ☐ Extend to a total of 5 Years Return to Base
- ☐ Upgrade Return to Base of Warranty Extension to On-Site

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Everybody's Connecting

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Network Cards

GA302T
Netgear GA302T Copper Gigabit Adapter (D4118)
$72

FA 311
Ethernet Adaptor 10/100Mps PCI (A1372)
$32

FA 411
10/100Mbps PC Card (No dongle required) (B9944)
$84

FA511
10/100Mbps CardBus PC Card (No dongle required) (D4112)
$89



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Managed Switches

These Managed Switches from NETGEAR provide a complete solution with all core components already built in. They provide complete Layer 2 management including SNMP, RMON, VLAN, QoS, Port Trunking, Radius and more. NETGEAR now also offer premium service and support options for businesses.

NEW Premium Support Services include same day and 4 hour capital city warranty replacement !

NEW



FSM726

FSM726
24 Ports 10/100Mbps, 2 x copper gigabit ports or 2 x GBIC slots.
Rent* $14.10/wk (J2423) **$1,258**

FSM726S
24 Ports 10/100Mbps, 2 x copper gigabit ports or 2 x GBIC slots, non-blocking backplane, stackable.
Rent* $15.35/wk (D8885) **$1,370**



FSM7505

FSM750S
48 Ports 10/100Mbps, 2 x copper gigabit ports or 2 x GBIC slots, non-blocking backplane, stackable.
Rent* $30.14/wk (G4121) **$3,037**

GSM712
10 ports 10/100/1000Mbps switch with 2x GBIC slots.
Rent* $37.00/wk (F4112) **$3,728**

AG711F
Managed Fibre gigabit module
Rent* $10.24/wk (D0924) **$914**

AG711T
Managed Copper gigabit module
(D0921) **$224**

Gigabit Switches

These unmanaged gigabit switches from NETGEAR provide lightening fast 10/100/1000 connections. All ports are automatic speed and full/half duplex sensing.

GS524T
24 Port 10/100/1000 gigabit switch.
Rent* $29.87/wk (D5961) **$3,010**



GS524T

GS516T
16 port 10/100/1000Mbps gigabit switch.
Rent* $22.20/wk (D5960) **$2,237**



GS516T

GS108
8 Port 10/100/1000Mbps gigabit switch.
Rent* $10.07/wk (H1741) **$899**

GS104
4 Port 10/100/1000Mbps gigabit switch.
Rent* $8.11/wk (F7306) **$724**



GS104

Broadband Access

DG824M
DSL modem router with wireless access point, firewall and 4 port 10/100 switch
(G8580) **$465**

DG814
DSL modem router with 4 port 10/100 switch
(F5181) **$286**

DM602
DSL modem router with USB and Ethernet
(F9650) **$199**

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Wireless Solutions

Firewall and VPN Routers

NETGEAR offer a complete range of ProSafe firewall routers which include SPI, DoS, logging and reports and alerts. All routers support VPN passthrough, content filtering and VPN endpoint termination is available on certain products.

FVM318 Cable/DSL ProSafe firewall, 802.11b Wireless access point, upto 102 VPN tunnels over WLAN and WAN, 8 x 10/100 switch
Rent* $19.95/wk (G8578) **$1,780**

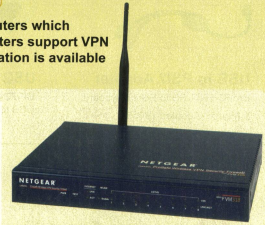
FVL328 Cable/DSL ProSafe firewall router, 100 VPN tunnels, 4 x 10/100 switch Rent* $12.83/wk (G8576) **$1,145**

FVS318 Cable/DSL ProSafe firewall router, 8 VPN tunnels, 4 x 10/100 switch (F0242) **$305**

FR114P Cable/DSL ProSafe firewall router, print server, 4 x 10/100 switch, ICSA Certified. (F0902) **$229**

FR328S Cable/DSL ProSafe firewall router, serial port for automatic fail over, 8 x 10/100 switch (G6240) **$385**

FM114P Cable/DSL ProSafe Wireless router, 802.11b access point, print server, 4 x 10/100 switch (F0904) **$385**



FVM318



FVL328

Not all items are in stock at all stores but can be ordered for Pick-up or Delivery

Delivery charges extra

Fast Delivery Australia-Wide

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Wireless Solutions

NETGEAR's wireless products supports 54 Mbps 802.11g* and 802.11b as well as 802.11a ensuring the maximum freedom of movement, flexibility and maximum throughput in all situations.

WAG511 54Mbps a/b/g tri band PC card NEW (H9135) **$245**

WGR614 54Mbps Cable/DSL Wireless Router NEW (J2416) **$309**

WG602 54Mbps wireless access point NEW (H9579) **$259**

WG511 54Mbps wireless PC card NEW (H9581) **$145**

MA521 11Mbps 802.11b wireless PC card (J4550) **$105**

MA111 11Mbps 802.11b USB adapter (H9137) **$139**

MR814 11Mbps 802.11b Cable/DSL Router NEW (H1735) **$239**

ME103 11Mbps 802.11b Prosafe Wireless Access point (H9141) **$375**

ANTENNAS Now available! Check www.ht.com.au for details



WAG511



ME103

*This product has been designed and developed to the draft IEEE specification for the 802.11g standard. Final ratification is expected in the second half of 2003. Specification is subject to change without notice

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COMMITMENT TO QUALITY

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Enhance Your Notebook

Not all items are in stock at all stores but can be ordered for Pick-up or Delivery

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USB to PS/2 Adapter

UKMC-100 USB to PS/2 Keyboard & Mouse Adapter (B0557) **$47**



USB Bluetooth Adapter

BF-7211
USB to Bluetooth Adapter
(H8797) **$89**



USB Flash Drives

Available from 32MB to 1Gig (see side panel)

USB Flash Storage Drives

- Pocket Size
- True Plug and Play
- Security Zone Feature



UFD-0032 32MB (G8721) **$49**

UFD-0064 64MB (G8722) **$74**

UFD-0128 128MB (G8723) **$119**

UFD-0256 256MB (G8724) **$198**

UFD-0512 512MB (G8725) **$396**

UFD-1000 1GB (J1849) **$699**



USB 2.0 Hubs

USB 2.0 hubs are backward compatible with USB 1.1 products.

UH-422 4 Port USB 2.0 Pocket Hub (G8675) **$88**

UH-402 4 Port USB 2.0 UFO Hub (G1938) **$88**



USB Mini Hubs

UH-201M 2 Port USB 1.1 Mini Hub (G1939) **$28**

UH-401M 4 Port USB 1.1 Mini Hub (G1940) **$39**





USB to Serial Converter

UMC-100
USB to 9 Pin RS232 Serial Converter (80782) **$69**



USB 2.0 Docking Station

Includes • 2 x USB 2.0 Ports, • 2 x PS/2 Ports, Printer Port, Serial Port & 10/100 Ethernet.

UDS-102 USB 2.0 Docking Station (G8691) **$219**



Card Bus Adapters

UCB-402 4 Port USB 2.0 Cardbus (G4199) **$95**

1394-201 2 port FireWire Cardbus (G8693) **$69**



USB 2.0 External HDD Enclosures

UHD-2500 USB2.0 to 2.5" HDD (G8727) **$89**

UHD-3500 USB2.0 to 3.5" HDD (H8796) **$120**



USB Multi Card Readers

BF-7352 USB 1.1 6-in-1 Card Reader (J2306) **$63**

BF-6261 USB 2.0 6-in-1 Card Reader (H8795) **$88**



USB Infrared Adapter

UIR-100 USB to IrDA Wireless Adapter (D8944) **$90**

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ntelligent KVM Solutions

ServerLink LCD Console Drawers

With a 15" TFT LCD screen, keyboard, touchpad and integrated KVM switch housed in an industry standard 19" 1U-height rack drawer, these LCD KVM switches save you up to 1/3 of valuable rack cabinet space.

INTEGRATED KVM SWITCH

(H2101, H2103) Includes all PS2 VGA cables



LKS-101H	1U Console Drawer 15" TFT LCD, Keyboard & mouse	Rent* $33.83/wk	(H2100)	$3,409
LKS-801H	8 Port KVM - LCD Console Drawer includes all cables	Rent* $37.45/wk	(H2101)	$3,959
LKS-1601H	16 Port KVM - LCD Console Drawer includes all cables	Rent* $42.56/wk	(H2103)	$4,499

ServerLink SOHO KVM Switches



Includes all cables

SL-251-P	2 port KVM inc.2 x 2m cables (E3692)	$199
SL-451-P	4 port KVM inc.4 x 2m cables (E3694)	$299

ServerLink Infinity KVM Switches

On-screen-display



SL-221	2 port ServerLink KVM for PS2		(B3047)	$269
SL-421	4 port ServerLink KVM for PS2		(A9890)	$349
SL-821	8 port KVM	Rent* $10.97/w	(97888)	$979
SL-1621	16 port KVM	Rent* $17.92/w	(97890)	$1,599

Avocent KVM Over IP

These all-in-one 16 port switches combine analogue and IP-based KVM switching for local access from your data centre and REMOTE access from anywhere in the world. Avocent's exclusive KVM over IP switching technology supports multi-platform, multi-location and multi-device installations, all over a standard IP connection.

Supports PC USB & SUN



Avocent

AVR1000	16 Port KVM over IP - 1 Local User & 1 Remote User	Rent* $59.97/wk	(G8455)	$6,499
AVR2000	16 Port KVM over IP - 1 Local User & 2 Remote Users	Rent* $75.92/wk	(G8332)	$8,530
AVRIQ-PS2	AVR Smart Cable - CAT 5 to PS/2 & VGA		(G8333)	$203

Avocent KVM Over CAT 5 UTP

Control hundreds or even thousands of servers from 8 users using Avocent's AMX Series KVM switches. This solution allows you to access your servers from up to 300 metres away using standard CAT 5 UTP RJ45 cabling. It also features full system management with an advanced Java-based administration tool.

Supports PC USB & SUN



Avocent

AMX5000	32 Port 8 User Matrix KVM Switch using CAT 5	Rent* $96.03/wk	(G4502)	$11,847
AMX5100	User Station for AMX5000 - Supports PS/2 & SUN	Rent* $22.07/wk	(G4503)	$1,969
AMIQ-PS2	AMX Smart Cable - CAT 5 to PS/2 & VGA		(G4501)	$346

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Delivery charges extra

Computer to SOHO & Infinity Cables for PS/2 & VGA



SL-CKP-02 2MTR (63972) $27

SL-CKP-03 3MTR (D0973) $39

SL-CKP-05 5MTR (63976) $65

SL-CKP-10 10MTR (78218) $117

Avocent

For Avocent's KVM over IP and KVM over CAT 5 switches you will require one CAT 5 Smart Cable per attached server

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Belkin - KVM Switches

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Belkin have a diverse product offering including networking and broadband sharing devices, award winning surge suppressors, wireless accessories, Firewire solutions, computer accessories, Audio/Video/Phone cabling and accessories and the largest selection of computer cables in the world. For more detailed product information and a look at our extensive range of connectivity solutions, come and visit our new look website at www.belkin.com.au!

CONNECT MULTIPLE COMPUTERS USING BELKIN KVM SWITCHES

F1DB102P - Economy 2-Port KVM Switch



- PS/2 Platform
- Hot key switching and manual push-button port selection
- Supports resolutions up to 2048x1536@85Hz

(D3162) **$92**

F1DB104P - Economy 4-Port KVM Switch



- PS/2 Platform
- 10 second auto-scan function
- LED indicators

(D3159) **$175**

B1DAU047 - SOHO Series 2-Port KVM Switch with Audio



- USB Platform
- Audio and microphone switching support
- Supports resolutions up to 2048x1536@85Hz

Awarded Gold Award from IDEA and IDSA

SPECIAL! Bundled with FREE cables

*Bundle offer available from 01/06/03 to 31/07/03 or while stocks last.

(H0630) **$369**

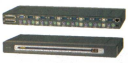
F1DS104T - SOHO Series 4-Port KVM Switch



- PS/2 and USB Platforms
- Audio and microphone switching support
- Hot key switching and direct-port access button

(D3167) **$340**

F1DA108Tz - Admin 8-Port KVM Switch with OSD



- Daisychainable
- Hot key switching
- PS/2 keyboard and mouse emulation
- PS/2 in, PS/2 & USB out

Rent* $9.29/wk (E5377) **$829**

F1DA116Tz - Admin 16-Port KVM Switch with OSD



- Dedicated daisychain ports
- BANK address displayed on front panel
- PS/2 in, PS/2 & USB out
- Comes with Belkin 5 year warranty

Rent* $12.31/wk (E5378) **$1,099**

Don't forget to include your Belkin All-In-One cables



The easiest & neatest way to connect all your computers and servers to your PS/2 & USB KVM switches, providing image clarity for high-resolution applications.

Belkin PDA

Leather Cases



F8P6401
For Palm Zire.
(H0798)
$48



F8Y1405
For Sony Clie SL/SJ Series.
(H5024)
$48

Charger



F8Q2000
USB Sync Charger for iPAQ. Suits 3800/ 3900/5000 Series.
(E4744)
$39

PROTECT AND INSURE YOUR VALUABLE EQUIPMENT FOR LIFE

The leader in power protection! Belkin offers a complete Power Protection range, for the average home to a total office solution. All Belkin Surge Protectors are guaranteed to protect against spikes, surges and lightning strikes. We will repair or replace any damaged connected equipment, offering the best no hassles connected equipment warranty in the business. Protect your valuable computer, stereo and electrical equipment today - for a lifetime!



F5C208z2-TEL3 - SurgeMaster 8-way (2m cord) with Telephone Protection and $80,000 Warranty • Lifetime, $80,000 Connected Equipment Warranty • Internet ready telephone/fax/modem protection • Max Spike Amperage of 39,000 Amps • BlockSpace™ to allow for large transformers • EMI/Radio frequency interference filtering for clean power. (C4607) **$119**



F5C206z2-TEL3 - SurgeMaster 6-way (2m cord) with Telephone and Coaxial Protection and $50,000 Warranty • Lifetime, $50,000 Connected Equipment Warranty • Protect your valuable Audio Visual Equipment • 1184 joule energy rating for maximum protection • 1.8 metre telephone cord and 1.8 metre coaxial cable included (C4604) **$98**



F5C195zTEL - Single Outlet MasterCube with Telephone Protection and $15,000 Warranty • Lifetime, $15,000 Connected Equipment Warranty • Max Spike Amperage of 27,000 Amps • 824 joule energy rating for maximum protection • Internet ready telephone/fax/modem protection • Convenient and portable for travelling (D5956) **$35**

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Belkin Networking Solutions

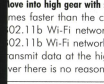
elkin are committed to providing quality products at competitive prices. We offer lifetime warranties on almost all of ur products and free expert technical support. For more detailed product information and a look at our extensive ange of connectivity solutions, come and visit our new look website at www.belkin.com.au!

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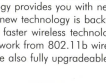
54g WIRELESS NETWORK!

ove into high gear with speeds up to 54mbps, without wires! 54g technology provides you with networking speeds nearly five mes faster than the current Wi-Fi (802.11b) standard. This brand new technology is backward compatible with the 02.11b Wi-Fi networking standard, so it allows you to implement faster wireless technologies in combination with existing 02.11b Wi-Fi networks. An added Turbo Mode will isolate your network from 802.11b wireless clients and allow your network to ansmit data at the highest 54g data rate. Belkin's 54g products are also fully upgradeable when 802.11g is ratified. Now more than ver there is no reason to delay, get wireless today.



F5D7230au4 - **54g Wireless DSL/Cable Gateway Router**
- Compatible with all 802.11b devices
- Network security with 128-bit WEP encryption
- Works with MAC or PC computers

(J2207) **$299**



F5D7130au - **54g Wireless Access Point**
- Extends your 802.11b or 54g wireless network
- 3 times the operating range of 802.11a
- Adds wirelessly networked PCs to your wired network

(H2200) **$279**

All come with Belkin Lifetime Warranty



F5D7000au - **54g Wireless Desktop Network Card**
- Fits any standard 32-bit PCI expansion
- Interoperable with all 802.11b 2.4GHz devices
- 3 times the operating range of 802.11a

(H2197) **$149**



F5D7010au - **54g Wireless Notebook Network Card**
- Fits any standard 32-bit Cardbus slot
- Low power consumption chipset
- Use Turbo mode for speeds of up to 54mbps

(H2196) **$149**

QUICK & SMART - USB SOLUTIONS FROM BELKIN



F5U228
Hi Speed USB 2.0 DVD Creator
- Capture video from analog sources to digital

(H0616) **$169**



F5U248
USB 2.0 8-in-1 Media Reader/Writer
- Works with CFI&II, SM, SD, MMC, MD, MS and MGS

(J2210) **$99**



F5U230
USB to Infrared Smartbeam
- Transfer files easily from your PDA, mobile or notebook

(H0927) **$97**



F5U900au
USB 2.0 Computer Upgrade Kit
- Achieve speeds of up to 480mbps

(F0897) **$99**

"ON THE GO"? CHECK OUT SOME OF OUR MOBILE ACCESSORIES



F8E825-USB - **Mini-Wireless Optical Mouse (USB)**
- The popular optical mini-mouse is wireless!
- Small and compact for travellers
- Engineered with the latest optical technology
- 27MHz for worldwide compatibility

(H5027) **$79**



F8E466-MOB - **Numeric Keypad**
- Works instantly with USB plug&play technology
- Slim, lightweight design
- Suits any notebook that is USB ready
- Comes with Belkin Lifetime Warranty

(J2212) **$29**



F8E448 - **Retractable USB Light**
- White LED lamp provides illumination in any setting
- Notebook clip positions light where you need it
- Swivel directional head
- Retractable 19" cable

(J0895) **$29**



F5U217-auMOB - **3-Port Hi-Speed USB 2.0 Pocket Hub**
- 3 USB 2.0 or USB 1.1 ports
- Extremely lightweight, perfect for travel
- Switching power supply-for worldwide use

(J2213) **$99**

HOT, HOT, HOT - Exclusive Specials from Belkin & Harris Technology!

BUNDLE! **F8E921 - SPECIAL!**

4-Port USB Hub + Optical Mini-scroller Mouse AND Hi-speed Modem Cable.

(J1899) **$79**

BUNDLE! **F8E922 - SPECIAL!**

3-Port USB Pocket Hub + Wireless Optical Mini-Mouse AND Retractable USB Light

(J1271) **$149**

BUNDLE! **Buy 1 get 1 FREE!** (w/out Tel)

B5Cau015 - SPECIAL!
SurgeMaster 5-way (2m cord) with Telephone Protection AND $25,000 Warranty.

(J2214) **$79**

*Bundle offers available from 01/07/03 to 31/07/03 or while stocks last

Belkin PDA

Hard Flip Case



F8Q1410
For iPAQ 3700/3900 with easy-access stylus holder

(H2222) **$59**

Penlight Stylus



For iPAQ 3800/3900/ 5000 series (G7751) **$23**

For Palm, Handspring, Sony, Jornada (G7752) **$23**

Accessories Kit

F8E924
For Compaq 1910 series

(J4674) **$99**

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CD and DVD Media: Storage for Life

Not all items are in stock at all stores but can be ordered for Pick-up or Delivery

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DataLifePlus DVD-R



4.7GB DVD-R 4x singles jewel case (H1479) **$7**

DVD-R 2x inkjet printable 20 pack spindle (F7683) **$125**

Video case also available

DataLifePlus DVD-RW



4.7GB DVD-RW 1x singles jewel case (C8841) **$9**

IT & T AWARDS RESELLER OF THE YEAR 2002

DataLifePlus DVD+R



4.7GB DVD+R 4x singles jewel case (H1255) **$7**

4.7GB DVD+R 2.4x inkjet printable 20 pack spindle (H0608) **$125**

Video case also available

DataLifePlus DVD+RW



4.7GB DVD+RW 2.4x singles jewel case (D9166) **$9**

Video case also available

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DataLifePlus CD-R



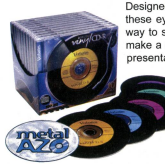
- 80 min 1x - 48x
- 10 pack

(H1680) **$10**

- 80 min 1x - 52x
- 10 pack slim case

(H9519) **$11**

Digital Vinyl CD-R



Designed to look like a vinyl record these eye-catching discs are a great way to save delicate LP collections or make a standout business presentation.

- CD-R: 80 min vinyl 10 pack

(G1731) **$11**

DON'T FORGET your Fly Buys points!

DataLifePlus Spindles

- Inkjet printable 80 min 48x spindle of 50

(G1742) **$35**

- Silver thermal printable 80 min 48x spindle of 50

(H1073) **$36**



- 80 min DatalifePlus spindle 30 pack 48x

(G5999) **$22**

- 80 min DatalifePlus spindle 50 pack 52x

(H9517) **$36**

DataLifePlus CD-RW

- 700MB CD rewritable 2x - 4x 5 pack colours

(D9230) **$7**

- 650MB 2x - 4x singles (77492) **$2**



- 650MB 16x -24x ultra speed singles (G1741) **$2**
- 650MB 4x -12x high speed 5 pack (G6434) **$8**

JUL 30

Verbatim DataLifePlus CD's represent the latest in technology. Featuring a proprietary blue Super-Azo dye which has the best resistance to sunlight, silver reflective layer for optimum read and write performance and multispeed recording.

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CD/DVD Production

CopyCat CD Duplicator

The easiest way to automatically copy CDs Just put your master in the reader and the blank in the burner. No PC required - totally stand alone burn only.

GREAT PRICE



CopyCat (J2058) **$465**

CW-50 CD/DVD Title Printer

- Single Colour Printing
- Single line
- Import simple graphics
- 200dpi thermal process

GREAT PRICE



(H0627) **$245**

Not all items are in stock at all stores but can be ordered for Pick-up or Delivery

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Pretec Digital Memory

CompactFlash



64MB	(B2922)	**$49**
128MB	(B2923)	**$85**
256MB	(C0777)	**$145**
512MB	(E1225)	**$295**
1GB	(H0070)	**$589**

SmartMedia



32MB	(B2916)	**$30**
64MB	(B2917)	**$52**
128MB	(C3680)	**$95**

MultiMediaCard



32MB	(B9873)	**$40**
64MB	(B9878)	**$68**
128MB	(F7833)	**$107**

Secure Digital



32MB	(D4116)	**$51**
64MB	(D4117)	**$66**
128MB	(D5918)	**$112**
256MB	(H0298)	**$225**

CopySmart Plus CD Towers

The CopySmart Plus CD Towers make stand alone manual CD copying easy and affordable.



- LCD status panel
- Simple 4 button interface
- CD backup at the touch of 1 button
- Support high speed CD-RW writing

40x CD-R 3 Drives Rent* $17.43/wk (F1867) **$1,555**

40x CD-R 7 Drives Rent* $30.85/wk (F1349) **$3,109**

CopySmart Plus DVD Towers

NEW

The CopySmart Plus DVD Towers make stand alone manual DVD copying easy and affordable.



4x DVD-R 3 Drives Rent* $36.57/wk (H0076) **$3,685**

4x DVD-R 5 Drives Rent* $50.25/wk (H0079) **$5,445**

4x DVD-R 7 Drives Rent* $64.22/wk (H0080) **$7,215**

Verbatim Pronto Duplicator

NEW



- Standalone, no PC required
- Autoloading mechanism
- 100 discs capacity
- LCD panel
- Auto-detect reject discs

CD-R 1 Drive Rent* $23.32/wk (J3010) **$2,350**

Primera Bravo Burn and Print

PRIMERA TECHNOLOGY, INC.

Introducing the World's first fully Integrated CD-R Burning and Printing Device.



- 2400 dpi Printing
- 48x CD-R or 4 x DVD drive
- Windows 2000/XP or MAC Software
- Fully integrated robotics
- 25 disc capacity for unattended burning and printing

Print only Rent* $27.97/wk (H0372) **$2,819**

48x CD-R Rent* $39.16/wk (G1708) **$4,139**

4x DVD-R Rent* $47.71/wk (G1709) **$5,170**

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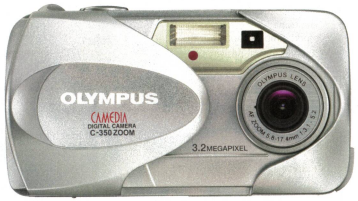
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Combining imagination with passion

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Delivery charges extra

CAMEDIA C-350ZOOM



- 3.2 Megapixel
- 3 x Optical Zoom
- Ultra-compact Design
- Scene Programs
- 1.8 inch LCD Monitor
- Ultra Compact Removable xD-Picture Card

Rent* $6.66/wk (H9717) **$595**

xD Picture Cards

32MB (H2545) **$50**

64MB (H2543) **$79**

128MB (G4747) **$146**

256MB (H2445) **$265**

C-740

FLY BUYS. 500 BONUS POINTS

- 3.2MP
- 10x Optical Zoom
- 3x Digital Zoom
- Manual and automatic controls
- Super macro

Rent* $11.15/wk (H9718) **$995**





C-5050Zoom

- 5 Megapixel
- Ultra-bright 3x Optical Zoom
- Accepts xD, CF, Smartmedia & Microdrive cards
- A professionally featured camera in the compact class.

Rent* $18.99/wk (G5487) **$1,695**

HARRIS TECHNOLOGY Perth, WA OPEN SOON

MJU 300

FLY BUYS. 500 BONUS POINTS

- 3.2 Megapixel
- Ultracompact
- Weather-proof metal body
- 3x Optical Zoom
- 4x Digital Zoom
- 5 scene programs
- Movie recording function.

Rent* $8.91/wk (H1533) **$795**



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High-Breed Monitors

SyncMaster 171N - 17" LCD Monitor



- 17" TFT computer monitor
- 1280 x 1024 max resolution
- 16.2 million colours
- Viewing Angle: (H/V) 140° /120°
- 350:1 contrast ratio
- Ultra slim bezel (13.5mm)
- Analogue Interface
- 3 year warranty

Rent* $10.86/wk **Silver** (F9638) **$969**

SyncMaster 172W - 17" LCD Monitor



- 17" TFT computer monitor
- 1280 x 768 Max Resolution
- 16.2 million colours
- 400:1 Contrast Ratio
- Viewing Angle: (H/V) 140° / 110°
- Analogue / Digital Interface
- 3 year warranty

Widescreen

Rent* $14.89/wk (G9866) **$1,329**

SyncMaster 191N - 19" LCD Monitor



- 19" TFT Computer Monitor
- 1280 x 1024 max resolution
- 16.7 million colours
- 170/170 viewing angle (H/V)
- 500:1 contrast ratio
- Ultra Slim Bezel (18.6mm)
- Analogue Interface
- 3 year warranty

Rent* $16.75/wk (H1088) **$1,495**

SyncMaster 151N - 15" LCD Monitor



- 15" TFT Computer Monitor
- 1024 x 768 max resolution
- 16.2 million colours
- 140/120 viewing angle (H/V)
- 330:1 contrast ratio
- Ultra Slim Bezel (16.2mm)
- Analogue Interface
- Ultra-sleek Design
- 3 year warranty

Professional Performance Space Saving Design

Rent* $6.93/wk **Silver** (J2170) **$619**

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Fyshwick Business Centre NOW OPEN IN ACT!

Ask About...

EXTENDED WARRANTY

- ☐ Extend to a total of 3 Years Return to Base
- ☐ Extend to a total of 5 Years Return to Base
- ☐ Upgrade Return to Base of Warranty Extension to On-Site

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New 5.0 Mega Pixel Digital Still Camera

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Delivery charges extra

Digital Still Cameras

MEMORY STICK

Cyber-shot

DSCP32



- 3.2 Megapixel
- 5x Playback Zoom
- 1.6" Colour LCD
- MPEG Movie VX

(H1620) **$495**

DSCP72



- 3.2 Megapixel
- 3x Playback Zoom
- Smart Zoom
- 1.6" Colour LCD
- MPEG Movie VX

Rent* $7.79/wk (H1622) **$695**

DSCP8S



- 3.2 Megapixel
- 3x Optical Zoom
- Smart Zoom
- 1.5" Colour LCD
- MPEG Movie VX
- AF Illuminator

Rent* $9.51/wk (H9498) **$849**

DSCP92

NEW



- 5.0 Megapixel
- 3x Optical Zoom
- Smart Zoom
- 1.5" Colour LCD
- MPEG Movie VX
- ISO Sensitivity Settings (Auto, 100, 200, 400)

Rent* $11.15/wk (J4493) **$995**

DSCP10S



- 5.0 Megapixel
- 3x Optical Zoom
- Smart Zoom
- 1.5" Colour LCD
- MPEG Movie VX
- Built-in Mic & Speaker

Rent* $13.39/wk (I0020) **$1,195**

All cameras supplied with battery, charger, software, USB cable and memory stick.

DVD +/- RECORDABLE DRIVES

DRU510A
Internal DVD +/- RW Drive
•IDE Interface



Rent* $7.39/wk (J4555)
$660

DRX 510UL
External DVD +/- RW
•i.LINK & USB 2.0 Interface
(J4556)
Rent* $11.19/wk
$999

HI-SPEED CERTIFIED USB

MICROVAULT

HI-SPEED CERTIFIED USB

USM32U2	(G8386)	**$95**
USM64U2	(G8388)	**$135**
USM128U2	(G8390)	**$215**
USM256U2	(G8394)	**$375**



- USB2.0 Storage Device
- Compatible with USB1.1
- Plug 'n' Play
- Software bundle includes: Password Lock, AutoZip, Auto Login, PC Lock
- Mini Micro Vault supplied with a docking station for easy access

MINI MICROVAULT

*NEW PRODUCT



USM32S	(J4481)	**$128**
USM64S	(J4482)	**$159**
USM128S	(J4483)	**$254**
USM256S	(J4484)	**$430**

Images for illustration purposes only

LCD RANGE



SDMHS53

H-SERIES

Sleek, lightweight and flexible design with zero footprint. Features include - bright picture, sharp images and wide viewing angles.

SDMHS53 15" XGA Display
Rent* $9.13/wk (J4477) **$815**

SDMHS73 17" SXGA Display
Rent* $13.73/wk (J4478) **$1,225**

SDMHS93 19" SXGA Display
Rent* $22.05/wk (J4480) **$1,968**

X-SERIES**

Sophisticated, smart design. All models feature DVI-D inputs in additional to standard VGA inputs, allowing digital signals.

SDMX52 15" XGA Display
Rent* $10.24/wk (F9282) **$914**

SDMX72 17" SXGA Display
Rent* $15.45/wk (F9284) **$1,379**

SDMX82 18" SXGA Display
Rent* $22.63/wk (F9286) **$2,019**

*H-Series available only in Grey

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Sony Tape Storage Solution

StorStation - AIT IDE & USB / i.LINK Tape Backup Kits



Internal AIT drive with ATAPI IDE (Ultra DMA) interface. Media life of approx 30,000 record/read cycles. Kits include: 1 cleaning tape, Retrospect software tape for desktop or server, cables and mounting screws.

Internal: SDX420B
Up to 90GB
AIT-1 Rent* $17.58/wk
(F9899) **$1,569**

Internal: SDX520B
Up to 130GB
AIT-2 Rent* $29.72/wk
(I0026) **$2,995**



External AIT drive with USB2.0/ i.LINK Interface. Media life of approx 30,000 record/read cycles. Kits include: 3 Tapes, 1 cleaning tape, Retrospect software for desktop or server, USB & 2 i.LINK cables.

External: AITE90UL
Up to 90 GB
AIT-1 Rent* $23.03/wk
(H9667) **$2,055**

External: AITE130UL
Up to 130 GB
AIT-2 Rent* $34.03/wk
(J4683) **$2995**

StorStation - AIT Internal or External SCSI Tape Backup Kits



AIT 3 kits include 10 x AIT3 100-260GB tapes bundled free of charge

SDX400B	35-90GB AIT 1 Internal Backup kit -	Rent* $23.77/wk	(C7480)	**$2,395**
SDXD400B	35-90GB AIT1 External Backup kit -	Rent* $26.59/wk	(C7478)	**$2,680**
SDX500B	50-130GB AIT2 Internal Backup kit -	Rent* $34.68/wk	(E1026)	**$3,495**
SDXD500B	50-130GB AIT2 External Backup kit -	Rent* $37.79/wk	(E1027)	**$3,995**
SDX700BKIT	100-260GB AIT3 Internal Backup kit -	Rent* $64.33/wk	(E1029)	**$7,495**
SDXD700BKIT	100-260GB AIT3 External Backup kit -	Rent* $72.44/wk	(G2855)	**$7,995**

StorStation - AIT Auto Loaders - So much storage, so little space



- Single AIT drive, 8 tape capacity
- Available in AIT-1, AIT-2 & AIT-3 format
- Large Capacity: up to 2TB (AIT-3 compressed)
- Small Size: designed to fit on a desktop
- Fast Backup: Up to 112GB/h (AIT-3 compressed)
- Easy Management from the front panel
- All autoloaders include SCSI terminator & cable, 8 tapes media and cleaning cartridge

LIBD81A1
Rent* $71.20/wk
(I0028)
$7,999

LIBD81A2
Rent* $83.84/wk
(I0029)
$9,999

LIBD81A3
Rent* $97.26/wk
(I0030)
$11,999

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SONY

AIT Media

SDX125C
25-50GB AIT-1 Tape Media with MIC
(64336)
$120

SDX135C
35-90GB AIT-1 Tape Media with MIC
(B2626)
$130

SDX250C
50-130GB AIT-2 Tape Media with MIC
(80637)
$165

SDX3100C
100-260GB Single AIT-3 Data Cartridge
(D6119)
$195

DDS Media

DGD120P
4mm DDS-2 120M (4/8GB) DAT Tape
(13262)
$13

DGD125P
4mm DDS-3 125M (12/24GB) DAT Tape
(66576)
$19

DGD150P
4mm DDS-4 150M (20/40GB) DAT Tape
(88711)
$45

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New external hard drives

Not all items are in stock at all stores but can be ordered for Pick-up or Delivery

Delivery charges extra

Your Best Ideas Need Maxtor OneTouch™



Easy - Just push the button to make a backup copy of your files.
Fast - Back up files faster than floppy, CD or removable cartridge systems.
Convenient - Make backup copies of your files, while you work, with a simple push of a button.
Flexible - Use Maxtor OneTouch™ or run automated, unattended backups with Dantz® Retrospect® Express.

Quick and Easy Installation

1. Install the software
2. Plug in the drive
3. Push the button and follow on-screen directions

Ask About... EXTENDED WARRANTY

DON'T FORGET your Fly Buys points!

RENTSMART

The figures quoted are based on a per week basis over 3 years. T.A.P, Terms & Conditions apply.

JUL 36

PERSONAL STORAGE 5000LE

Perfect for home or office
Exclusive Maxtor OneTouch 80GB



80GB (G4110) **$349**

Ideal for home or office, the Maxtor Personal Storage™ 5000LE external hard drive quickly adds storage and organisational space through your computer's USB port.

- Easy add-on storage for home or office
- Perfect for photos, music and documents
- Maxtor OneTouch™: the easy way to make backup copies of your files
- Dantz® Retrospect® Express software included
- USB 2.0/1.1 compatible
- Up to 480MB/sec data transfer rate
- Quick and easy installation
- Maxtor award-winning hard drive technology
- Stands vertically or horizontally

PERSONAL STORAGE 5000DV

Perfect for video editing and high-end graphics
Exclusive Maxtor OneTouch™ 160/200GB



160GB (H0596) **$549**

200GB Rent* $7.83/wk (H0553) **$699**

The Maxtor 7200RPM hard drive featuring both FireWire (IEEE1394, i.LINK®) and USB 2.0 interface ports gives you one of the most versatile drives available for your PC.

- Versatile add-on storage for editing videos and high-end graphic files
- Maxtor OneTouch™: the easy way to make backup copies of your files
- Dantz® Retrospect® Express software
- Quick and easy installation
- Flexible dual interfaces—FireWire® and USB 2.0/1.1 compatible
- Powerful performance—7200RPM

PERSONAL STORAGE 5000XT

Perfect for storage-hungry files
Exclusive Maxtor OneTouch™ 250GB



250GB Rent* $7.83/wk (G4113) **$699**

Flexible add-on storage for your home or office, with room to grow. With 250GB, the Maxtor external hard drive provides you with enough capacity to hold and organize your storage-hungry applications and files.

- Flexible add-on storage for storage-hungry files
- Maxtor OneTouch™: the easy way to make backup copies of your files
- Dantz® Retrospect® Express software included
- Quick and easy installation
- Flexible dual interfaces—FireWire® and USB 2.0/1.1 compatible
- Rotational Speed 5400RPM
- Stands vertically or horizontally
- Hot-swappable

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IOMEGA

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Web Direct www.ht.com.au/cat/iomega

Smart Storage Solutions

Zip 750MB Drive



More speed and more capacity, this NEW 750MB drive and disk is the fastest and most durable, portable storage solution to back up your important data.
Iomega Automatic Backup software makes backup a snap and Iomega Sync software helps transfer files between computers. Zip 750MB drives and disks are the smart data storage choice.

USB 2.0 (F9601) **$370**

Firewire (G2978) **$397**

External Hard Disk Drive



Iomega External Hard Drive adds secure storage easily and quickly.
It comes complete with Iomega Sync™ and Automatic BackUp™ disaster recovery software to protect your files.

USB2 Card sold separately

USB 2.0 80GB (F9625) **$459**

USB 2.0 120GB Rent* $6.89/wk (F9789) **$519**

Not all items are in stock at all stores but can be ordered for Pick-up or Delivery

Delivery charges extra

NEW!

Iomega Mini Drive

Iomega USB mini-Drives weigh less than 20g can be carried with your keys or in your pocket. Comes with 3 year warranty, 32 bit processor for greater speed and versatility, Iomega's unique security and software.

64MB



(G8250) **$119**

128MB



(G9836) **$169**

256MB



(H9652) **$299**

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Host Powered 250MB USB

NEW – Host-powered Zip® 250MB USB drive.
Now it's even easier to take your information with you. The Zip® 250 USB drive is now available with a USB cable that provides both data and power, so you don't need any external power source. It's easy to connect (just plug it in) and easy to launch (no rebooting)! This new drive is compatible with most major operating systems and all Zip® 100MB and 250MB Zip® disks.



(B6404) **$287**

Portable Hard Disk Drive

Iomega portable hard drive is a complete solution that makes security, recovery and data storage easy.
QuikSync™ automatic back-up and disaster recovery software protects your files. Built in a durable, slim design that's easy to take with you.



USB2 Card sold separately

USB 2.0 20GB (G4671) **$365**

USB 2.0 40GB (F9794) **$549**

NAS Servers

NEW!

Non Hot Swapable Drive

NA205m	160GB	P4 Celeron CPU, 256MB RAM	Rent* $24.64/wk	(J4653)	**$2,199**
NA305m	240GB	P4 Celeron CPU, 256MB RAM	Rent* $35.72/wk	(J4651)	**$3,599**



Hot swapable drive/fan/power supply

NP435m	320GB	Intel P4 1.8Ghz CPU, 512MB RAM	Rent* $71.20/wk	(J4601)	**$7,999**
NP440m	480GB	Intel P4 2.0Ghz CPU, 1GB RAM	Rent* $83.84/wk	(J3572)	**$9,999**
NP445m	720GB	Intel P4 2.0Ghz CPU, 1GB RAM	Rent* $102.13/wk	(J3481)	**$12,599**
NP800m	960GB	2 Intel Xeon 2.4Ghz CPU, 1GB RAM	Rent* $Call/wk	(J3262)	**$Call**
NP850m	1.44TB	2 Intel Xeon 2.4Ghz CPU, 2GB RAM	Rent* $Call/wk	(J4650)	**$Call**



CD-RW 52x24x52 USB 2.0

For the fastest and easiest way to save and share music, photos and more, choose an Iomega® CD-RW drive. With up to 52x24x52 write/rewrite/read speeds you can burn a 60-minute CD in less than 3 minutes. Includes plug-and-play functionality for portability, buffer under-run protection for reliability and Iomega HotBurn® Pro software with advanced functionality easy CD customization, burning MP3s and organizing digital photos. (USB 2 Card sold seperately)



(J0752) **$357**

DVD Combo Drive

Iomega introduces its multi-format DVD/CD-RW drive you can read and record in nearly any standard format. Everything you need is here for creating, editing, and sharing video, music, photos and more!



- DVD+RW 4x Record, 2.4x ReWrite, 12x Read
- DVD-RW 4x Record, 2x Rewrite, 12x Read
- CD-RW 16x Record, 10x ReWrite, 40x Read

Don't be caught short!

Rent* $8.95/wk (J4558) **$799**

Sales: 1300 13 9999 Web: www.ht.com.au
Fax: 1300 13 6666 Email: sales@ht.com.au

This catalogue valid 01/07/2003 to 31/07/2003

LACIE

Prices are subject to change. Check here for latest prices & products!

Web Direct www.ht.com.au/cat/lacie

Best Storage Solutions

Not all items are in stock at all stores but can be ordered for Pick-up or Delivery

Delivery charges extra

d2 External Hard Disks

The LaCie d2 range is a professional flexible system. Made of extruded aluminium and Zamac alloy, which are the same materials used in Formula 1 car designs for their unique features: robustness, lightweight and fast cooling. BD packages include a Kensington cable lock and power lock for excellent security. The drive switches on and off with your computer and features a front power button and blue activity LED. Supplied with drivers for PC. Drives can be used stacked horizontally or can be mounted in a 1U 19" rack (kit sold separately).



Stackable	80GB	7200rpm	USB 2.0		(G1817)	$399
	120GB	7200rpm	USB 2.0		(G1281)	$499
	200GB	7200rpm	USB 2.0	Rent* $7.72/wk	(G4245)	$689
	80GB	7200rpm	FireWire		(G1744)	$399
	120GB	7200rpm	FireWire		(F7923)	$499
	200GB	7200rpm	FireWire	Rent* $7.72/wk	(G3138)	$689
Rack mountable	200GB	BD 7200rpm	USB 2.0 & FireWire & F800#	Rent* $9.85/wk	(J0708)	$879
	400GB	BD 7200rpm	USB 2.0 & FireWire & F800#	Rent* $16.80/wk	(J0709)	$1,499
	500GB	BD 7200rpm	USB 2.0 & FireWire & F800#	Rent* $22.28/wk	(J0710)	$1,899

NEW *F800 is a new FireWire interface doubling transfer rate (up to 100MB/s) of current FireWire interface. Requires specific F800 card to take advantage of the performance.





LaCie Data Bank 20GB

USB & FireWire & design by F.A. Porsche

Rent* $7.68/wk (H2008)

$686

LaCie PCI card USB 2.0 4 ports (G4157)

$49

FireWire PCI Card 4 ports (G8509)

$49



LaCie USB Floppy Drive (F8125)

$79

d2 External CD-R 52x

LaCie CD-R 52x is one of the fastest CD-Recorder on the market, burning a full 700MB CD in less than 2 minutes. It comes complete in the now famous d2 casing, with



CD-RW 52/24/52 USB 2.0	(H0517)	$295
CD-RW 52/24/52 Firewire	(H0519)	$325
CD-RW 52/24/52 USB 2.0 & Firewire	(H0368)	$355

CD Duplicator 1-2-1 standalone & connected mode:

NEW CD Duplicator CDR52+DVD16x USB2.0 Rent* $8.60/wk (J0485) **$768**

d2 External DVD-R Pioneer's

LaCie CD-R/ DVD-R is based on Pioneer A05 mechanism: DVD-R 4x / DVD-RW 2x / CD-R16x / CD-RW 8x. It comes complete with all software for PC, all cables and one DVD-R and CD-RW media.



DVD-R/RW/CD-RW (A05) USB 2.0 & FireWire

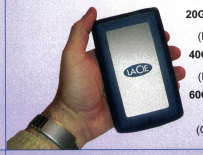
Rent* $7.83/wk (G9780) **$699**

DVD-R/RW/CD-RW (A05) Internal IDE drive

(G9595) **$499**

Pocket Hard Disks

LaCie Pocket hard disks are the most robust and mobile drives on the market. Made of light aluminium for better cooling and fully moulded in a silicon bumper for protection. Includes USB 2.0 and bus powered Firewire interface, complementary power supply and drivers.



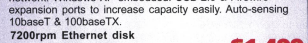
20GB USB 2 .0 & FireWire (F5369) **$379**

40GB USB 2.0 & FireWire (F5371) **$499**

60GB USB 2.0 & FireWire Rent* $7.27/wk (G6146) **$649**

d2 Ethernet disks

NEW



Connect up to 500 users (Mac, PC & Unix) on any type of network. Windows XP embedded. USB 2.0 & Firewire expansion ports to increase capacity easily. Auto-sensing 10baseT & 100baseTX.

7200rpm Ethernet disk

(80GB)	Rent* $16.80/wk	(J4511)	$1,499
(160GB)	Rent* $19.67/wk	(J4512)	$1,755

7200rpm 8MB Cache Ethernet disk

(250GB)	Rent* $23.60/wk	(J0705)	$2,378
(500GB)	Rent* $33.04/wk	(J0706)	$3,329

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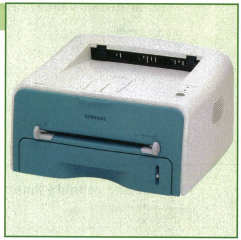
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Quality and innovation, no risk

SAMSUNG ML 1510

Meet the smallest one!

Key features:
- World's smallest 14ppm mono laser
- USB interface
- Windows, Macintosh and Linux compatible
- With toner save on prints at under 2.7 cents per page
- 2 year return-to-base warranty



(I0235) **$359**

SAMSUNG SCX 4216F

The Laser print solution for everyone!

Key features:
- 16ppm mono laser multifunction
- Copy, Fax, Scan and Print
- USB interface
- Windows, Macintosh and Linux compatible
- With toner save on prints at under 2.7 cents per page
- 2 year return-to-base warranty



Rent* $9.40/wk (J2137) **$839**

SAMSUNG ML 2151n

Workgroup Laser printing, with Duplexing at no extra cost!

Key features:
- 20ppm
- network mono Laser Printer with
- Built in auto duplexing (Double Sided Printing)
- Standard 500 Sheet paper tray
- Optional Wireless printing module
- 3 year on site warranty

DigitAllreassurance
3 year on site warranty



Rent* $11.71/wk (J3290) **$1,045**

Not all items are in stock at all stores but can be ordered for Pick-up or Delivery

Delivery charges extra

HARRIS TECHNOLOGY
Perth, WA
OPEN SOON

Ask About...

EXTENDED HARRIS TECHNOLOGY WARRANTY

- ☐ Extend to a total of 3 Years Return to Base
- ☐ Extend to a total of 5 Years Return to Base
- ☐ Upgrade Return to Base of Warranty Extension to On-Site

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LEXMARK

Passion for printing ideas™

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High Performance Desktop Laser Printer

Not all items are in stock at all stores but can be ordered for Pick-up or Delivery

Delivery charges extra

Ask About...

EXTENDED HARRIS WARRANTY

- ☐ Extend to a total of 3 Years Return to Base
- ☐ Extend to a total of 5 Years Return to Base
- ☐ Upgrade Return to Base of Warranty Extension to On-Site

The affordable laser printer for users with demanding print needs



Lexmark E321

- Laser monochrome print technology
- Processor 100 MHz
- 300 x 300 dpi , 600 x 600 dpi print resolution
- Print Speed (A4, black) Up to 19 pages per minute
- Time to First Page (black) 9.5 seconds
- Memory base model, standard 8 MB
- Memory base model, maximum 72 MB

Rent* $6.26/wk (J3292) **$559**

The fast and reliable laser printer for users with demanding print needs



Lexmark E323T

- Laser monochrome print technology
- Processor 200 MHz
- Black 1200 Image Quality
- 600 x 600 dpi print resolution
- Print Speed (A4) Up to 19 pages per minute
- Time to First Page 9.5 seconds
- Memory base model, standard 16 MB
- Memory base model, maximum 144 MB

Rent* $10.41/wk (J3293) **$929**

Prices are subject to change. Check here for latest prices & products!

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SimpleTech

Memory Solutions & Technology

IT & T AWARDS RESELLER OF THE YEAR 2002

Fyshwick Business Centre NOW OPEN IN ACT!

JUL 40

SimpleTech Secure Digital



Don't just save your data, secure it with SimpleTech Secure Digital cards. Features a write protect switch on the side of the card. Also features cryptographic security for copyrighted data based on Secure Digital Music Initiative portable device requirements. Is designed for unlimited compatibility with digital cameras, music players, and other devices that use Secure Digital (and MultiMedia Card).

- **Lifetime warranty, Secure Digital Card Range.**

32MB	(G9385)	**$59**
64MB	(G9390)	**$79**
128MB	(G9395)	**$134**
256MB	(H0296)	**$235**
512MB	(H5011)	**$779**

SimpleTech Bonzai USB Mini-Drive



An expandable, pocket-size USB storage device for your personal files. Use to store, transfer and carry your business documents, including Microsoft PowerPoint, Excel and Word files, to work anywhere you travel. Carry favorite digital pictures, MP3 music, video and audio clips to share with family and friends. Even store games for a little fun between projects.

- **SD or MMC flash card expandable**
- **USB interface**
- **1.5MB/second transfer rate.**

64MB	(G9372)	**$109**
128MB	(G9373)	**$185**
256MB	(G9374)	**$269**

SimpleTech VEO SD Camera



Plug the Photo Traveler into your Palm's expansion card slot and you're ready to take snapshots with your handheld! Simple plug-and-play operation automatically loads the software on your Palm™ OS the first time you plug in the camera. Full colour preview lets you fram the photo and instantly see the result.

- **640x480 digital resolution.**
- **Takes 24-bit full colour photos.**
- **Transferred images are standard JPEG pictures.**
- **Automatic exposure, white balanc and colour control.**
- **Palm™ OS plug-and-play capabili y**
- **Swivel lens with adjustable focus.**
- **Full featured software for managi images and transferring to the PC**

(I0116) **$199**

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The Power to Create

EPSON STYLUS PHOTO 915



- 5760 optimised dpi using RPM technology
- 4 picolitre Micro Dots, for extremely fine print detail• EPSON Intellidge ink system
- True Border-free edge-to-edge printing on cut sheet or roll paper • Roll paper holder included • Over 25 years lightfastness using EPSON ColorLife paper • Direct printing via camera card • Optional LCD Preview Monitor.

(G3333) **$449**

PERFECTION 3200 Scanner



- 3200 x 6400dpi optical resolution • 48-bit colour depth • Optical Density: 3.4 Dmax • USB2.0 and IEEE1394 (Firewire) interfaces • Lid type film adapter with 4 x 9" scanning area. Scan up to two film strips of up to six 35mm frames (total of 12 frames) • Adobe PhotoShop Elements and LaserSoft SilverFast SE6 bundled • 1 year warranty

Rent* $9.29/wk (H8527) **$829**

EPSON STYLUS C61



- Crisp text, vibrant colours coupled with speed and reliability • Up to 14ppm black text A4 (memo) printing • 5760 x 720 optimised dpi using RPM technology • USB and Parallel enabled.

(F8180) **$179**

EPSON STYLUS PHOTO 830U



- 6-colour ink system • Up to 14ppm black text printing A4 economy • 5760 optimised dpi using RPM technology for true photo quality
- MicroPiezo technology • Incredible fine 4 picolitre ink droplets • True Border-free printing • 2 x USB interface • Photo Quicker 3.4 • up to 25years lightfastness.

(J2312) **$289**

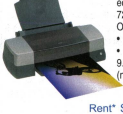
EPSON STYLUS PHOTO2100



- Up to 2880 x 1440 dpi • 7 colour individual ink system with a new light black and either photo or matte black • A3+
- Epson Intellidge ink system • True Border-free printing • Roll paper printer and auto cutter • 75yrs lightfastness • Up to 1.3mm thick media support.

Rent* $20.05/wk (F2969) **$1,789**

EPSON STYLUS PHOTO1290S



- A3+ • 6 colour photo printing • Border-free edge-to-edge printing • Max res 2880 x 720dpi with variable sized droplet technology • Over 25 years lightfastness prints
- Features print image matching technology
- On demand inkjet (piezoelectric) • Black text 9.4ppm (economy) • Text & photo 3.0ppm (normal) • Full page colour 1.3ppm (normal).

Rent* $11.08/wk (G4593) **$989**

Mono Laser Printer EPL 6100



- Fast 16ppm print engine • True 1200dpi for superior print quality! • Powerful, 200MHz 64-bit RISC CPU! • Class leading durability - 15,000 pages per month duty cycle• 6,000 page toner cartridges
- Superb paper handling • 250 sheet paper input, Network capable.

Rent* $8.23 /wk (F3399) **$735**

Colour Laser Printer AL C900



The AcuLaser C900 is perfect for printing a wide range of professional office documents such as in house stationary, brochures, direct mail and flyers, customer and internal newsletters, web prints, business reports and submissions. • printing up to 2400 dpi
- 16ppm black• 4ppm colour

Rent* $21.46/wk (G8809) **$1,915**

Multifunction Printer Home CX3100



- Printing - colour printing up to 5760 Optimised DPI up to 14ppm (black-and-white economy mode) • Standalone - full colour copier capabilities • Scanning - 48-bit colour depth (internal) scanning • Faxing - Using your existing PC and modem take full advantage of your existing fax software.

(H0697) **$360**

Multifunction Printer Office CX5100



- Printing - colour printing up to 5760 Optimised DPI • up to 22pm A4, black-and-white economy mode • Standalone - full colour copier • Scanning - 48-bit colour depth
- Faxing -Using your existing PC and modem take full advantage of your existing fax software.

Rent* $6.16 /wk (H0780) **$550**

Not all items are in stock at all stores but can be ordered for Pick-up or Delivery

Delivery charges extra

Epson Inks

Black 810/830/925 (C9764) **$45**

Colour 810/830/925 (C9765) **$37**

Colour 870/890/895/915 (96455) **$35**

Black 870, 890, 895, 1270,1290 (A0630) **$32**

Black C41UX/SX (F7743) **$20**

Colour C41UX/SX (F7742) **$33**

Black C60/C61/CX3100 (D0043) **$52**

Colour C60/C61/CX3100 (D0044) **$47**

Epson Paper

Premium Glossy Photo Paper 100 x 150mm



(H9042) **$9**

Photo Paper (A4)



(39631) **$20**

Photo Quality inkjet paper



(77273) **$29**

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Fax: 1300 13 6666 Email: sales@ht.com.au

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Canon
advanced simplicity

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advance technology ...

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Canon advanced simplicity — new digital cameras.....

Canon PowerShot A300 DIGITAL CAMERA

NEW



- Compact and stylish 3.2 Megapixel digital camera with Canon 5x digital zoom lens.
- 12 shooting modes, from complete control to full automatic mode allowing manual selection of aperture and shutter speeds.
- Movie recording and playback with sound - 640 x 480(L) and 320 x 240 (M)

(H9815) **$495**

PowerShot A70 DIGITAL CAMERA

NEW



- Compact and stylish 3.2 Megapixel digital camera with Canon 3x optical zoom lens.
- 12 shooting modes, from complete control to full automatic mode allowing manual selection of aperture and shutter speeds.
- Movie recording and playback with sound - 640 x 480 and 320 x 240

Rent* $7.56/wk (H2206) **$675**

PowerShot A60
2.0MP

NEW



Rent* $6.66/wk
(H2209)
$595

DIGITAL IXUS 400

NEW



- 4.0 Megapixel CCD image sensor delivers 2272x1704 pixel resolution.
- Canon 3x zoom lens (35mm equivalent: 36-108mm) f/2.8-4.9 with smooth 3.6x digital zoom.
- DIGIC Digital Imaging Processor combines camera controls and image signal processing to deliver superior digital pictures.

Rent* $11.15/wk (H2207) **$995**

Canon PowerShot S50 DIGITAL CAMERA

NEW



- 5 Megapixel 1/1.8" CCD image
- 2592 x 1944 pixels.
- High resolution Canon 3x f/2.8-4.9 aspherical zoom lens
- Selectable 9 point AiAF,
- 9 position white balance
- Manual and automatic shooting modes
- 3 light metering modes, from ISO 50 to 400.

Rent* $15.41/wk (H2210) **$1,375**

Digital IXUS II
3.2MP

NEW



Rent* $10.03/wk
(J2473)
$895

LiDE20 flatbed scanner

LiDE LED Indirect Exposure



- One touch scan, copy and email.
- USB interface.
- 600 x 1200 dpi.
- 48-bit input.
- 24-bit output.

(F9858) **$139**

CanoScan 3000 F

NEW



- Film scanning
- 1200 x 2400 dpi optical resolution with 48-bit input depth.
- Advanced Z-Lid keeps books and other bound documents flat on the scanner for evenly lit scans.
- Fast scanning thanks to the USB 2.0 Hi-Speed interface.

(H2228) **$285**

PowerShot G3
4.0MP



Rent* $17.65/wk
(G4632)
$1,575

N640P ex 600dpi	LiDE30 1200dpi	LiDE50 1200dpi	CS5000F 2400dpi film scanning	CS8000F 2400dpi film scanning	CS9900F 3200dpi film scanning
					
(D4026) **$129**	(H2229) **$209**	(H2230) **$235**	(G4633) **$379**	Rent* $6.33/wk (G5524) **$565**	Rent* $8.50/wk (H2231) **$759**

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Canon
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... simple to use

Canon advanced simplicity

multifunction devices.....

Not all items are in stock at all stores but can be ordered for Pick-up or Delivery

Delivery charges extra

Laser Shot LBP-2410

NEW

Colour Laser Printer



- 16ppm mono, 4ppm colour
- Zero warm up time
- Fastest first page to print
- No extra RAM required
- Optional network printing
- USB 2.0 high speed connectivity for fast data transfer

Rent* $19.59/wk

(J2427) **$1,748**

imageCLASS MP 730

NEW



- 5-in-1 print, copy, scan, fax and memory card printing.
- Direct Memory card printing.
- Up to 22 pages per min (mono).
- Up to 14 pages per min (colour).
- 1200 x 2400 dpi scanning resolution.
- 33.6 Kbps Super G3 Colour Fax with 35-sheet automatic document feeder

Rent* $8.50/wk (J4652) **$759**

imageCLASS mpc190

Printer, scanner, copier



(H2216) **$279**

imageCLASS MPC 200

- Print, copy, scan, memory card printing.



(G4582) **$339**

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new printers.....

Canon advanced simplicity

s200spx bubble jet printer



- Up to 2880 x 720 dpi resolution.
- Cost-saving permanent print head technology.

(H2211) **$76**

i320 bubble jet printer



- Print up to 10ppm in mono
- Up to 7ppm in colour
- Up to 2400 x 1200dpi resolution
- Borderless 6" x 4" photo prints

(G4584) **$125**

i450 bubble jet printer

NEW



- Print up to 18ppm in mono
- 4800x1200dpi print resolution
- 2 picolitre ink drops
- Borderless photo prints up to A4 size

(J2418) **$195**

i550 bubble jet printer



- Print up to 18ppm in mono
- Up to 11ppm in colour
- Up to 4800 x 1200 dpi
- Individual ink tanks for low running costs

(H2217) **$285**

i850 bubble jet printer

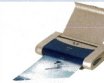
NEW



- Print up to 22 ppm in mono
- 14 ppm in colour
- Economical individual ink tanks
- High resolution 4800 x 1200 dpi printing

(H2218) **$359**

i70 bubble jet printer



- Print up to 13ppm in mono
- 4800 x 1200 dpi resolution.
- Direct printing from compatible Canon digital cameras.
- USB & Wireless Infrared interfaces.

(H2219) **$499**

s330 bubble jet printer



- Print up to 14ppm in mono and 10ppm colour printing
- Full bleed photo print.
- Up to 2400 x 1200dpi resolution
- Colour lasts up to 25 years using Canon's photo paper pro

(G2318) **$139**

i470D bubble jet printer

NEW



- 4800x1200 dpi print resolution
- 2 picolitre ink drops
- Camera direct and memory card direct printing
- Borderless photo prints up to A4 size

(J2419) **$385**

i6100 bubble jet printer

NEW



- Print up to 12ppm in mono
- 2400x1200 dpi print resolution
- 5 picolitre ink drops
- Up to A3+ size printing - 329x483mm

Rent*$6.49/wk

(J2420) **$579**

i9100 bubble jet printer



- A3 photo prints in around 2 minutes
- 4800x1200 dpi printing
- Borderless photo printing up to A3+ size - 329x483mm
- 6 ink system

Rent* $13.15/wk

(J2421) **$1,174**

Ask About...

SKYSHIELD by HARRIS Technology WARRANTY

- ☐ Extend to a total of 3 Years Return to Base
- ☐ Extend to a total of 5 Years Return to Base
- ☐ Upgrade Return to Base of Warranty Extension to On-Site

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The figures quoted are based on a per week basis over 3 years. T.A.P, Terms & Conditions apply.

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hp LaserJet Printers

Not all items are in stock at all stores but can be ordered for Pick-up or Delivery

Delivery charges extra

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RETAILER
OF THE YEAR
2 0 0 2

hp LaserJet 1300 Series



- 20ppm with 133MHz Motorola Coldfire processor • 1200 x 1200dpi print quality
- 16MB RAM up to 80MB max • hp PCL 5e, 6 & Postscript level 2 emulation • 250 sheet input tray •10,000 page duty cycle.

hp LaserJet 1300
Rent* $9.10/wk (H9826) **$812**

hp LaserJet 1300N
Rent* $14.16/wk (H9827) **$1,264**

hp colour LaserJet 1500 Series



- 16ppm black, 4ppm optimal colour
- Quiet operation
- 125 sheet multi-purpose
- 125 sheet face down output (250 & 500 sheet paper trays available)
- straight through paper slot for thick media
- ImageREt 2400
- 16MB RAM

hp LaserJet 1500L (Lite Version)
Rent* $18.96/wk (J2056) **$1,692**

hp LaserJet 1500 (Base Unit)
Rent* $21.90/wk (J2057)

hp LaserJet 2300 Series



- 25ppm, up to 8ppm duplex
- 1200 x 1200dpi print quality
- 32MB RAM up to 288MB max
- hp PCL 5e, hp PCL 6, PostScript 3™ & automatic language switching
- up to 350 sheet input tray
- up to 50,000 page duty cycle.

hp LaserJet 2300
Rent* $16.75/wk (H9828) **$1,495**

hp LaserJet 2300D
Rent* $18.02/wk (H9829) **$1,608**

hp LaserJet 2300N
Rent* $21.57/wk (H9830) **$1,925**

hp LaserJet 2300DN
Rent* $23.75/wk (H9831) **$2,119**

hp LaserJet 2300DTN
Rent* $26.84/wk (H9832) **$2,705**

Web Direct

See Web Direct Link (at top of page) for more products and latest info!

hp LaserJet 4200 Series



- 33ppm with 300 MHz processor
- HP ProRes 1200 - true 1200dpi at engine speed
- 48MB RAM up to 416MB
- 500 sheet input tray & 100 sheet multi-purpose tray
- 2 EIO slots
- 150,000 page duty cycle.

hp LaserJet 4200
Rent* $23.94/wk (G4255) **$2,136**

hp LaserJet 4200n
Rent* $28.23/wk (G4256) **$2,845**

hp LaserJet 4200tn
Rent* $32.64/wk (G4257) **$3,289**

hp colour Laserjet 4600 Series



- 16ppm black, 16ppm colour with 400 MHz processor
- HP in-line technology enables printing in one pass
- 96MB RAM up to 416 MB
- 100-sheet multi-purpose tray
- 500-sheet feeder tray (additional 500-sheet paper tray available)
- 3 EIO slots
- 85,000 pages duty cycle.

hp color Laserjet 4600
Rent* $41.56/wk (E7298) **$4,393**

hp color Laserjet 4600DN
Rent* $49.73/wk (E7299) **$5,389**

hp color Laserjet 4600DTN
Rent* $64.65/wk (E7300) **$7,264**

Ask About...

GET ENGINED BY HARRIS TECHNOLOGY FINANCE

hp DeskJet 9300 Series



Fast, professional premium photo quality printing

- up to 4800 optimised dpi in colour and rich black text
- Printing up to 14ppm mono & 11ppm colour
- 8MB RAM built-in
- 150 sheet tray
- IEEE 1284 parallel, USB interface

hp Deskjet 9300
Rent* $6.71/wk (J4593) **$599**

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hp deskjets & officejets & PSC

hp deskjet 6122



- High speed colour printer perfect for the small to medium business
- Up to 4800 x 1200 dpi in colour and 600 x 600 dpi in black • Prints up to 20ppm in black and 13ppm in colour
- 8MB built-in memory
- USB 2.0 and parallel interface
- 150 sheet input tray
- Automatic 2 sided printing
- Low ink indicator light.

(G2451) **$275**

hp deskjet 5550

Enhance your productivity



- Photo-quality with HP PhotoREt 4 colour layering technology
- 8MB built-in RAM • Up to 4800 x 1200 optimised dpi using HP colourfast photo paper and 1200 x 1200 input dpi, black: up to 1200 x 1200 dpi rendered black text on inkjet paper
- Mono up to 17ppm
- Colour up to 12ppm • Parallel , USB 2.0
- 100-sheet input tray, 50 Sheets output tray

(F7710) **$185**

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Delivery charges extra

For all your short term computer hire needs

KWIKTRON

Kwiktron's vast inventory of the latest equipment is in-stock and ready for immediate delivery.

02 9774 8666

hp deskjet 3420



- Print up to 10 pages per minute in black
- Print up to 8 pages per minute in colour
- Get brilliant photo quality with up to 2400 x 1200-dpi using premium photo papers in best mode
- Perfect for all types of print projects - get excellent results on a variety of papers including plain, photo papers and transparencies
- Print longer lasting photos using HP's specially developed inks and papers
- * On-screen ink-level indicator
- * On-screen print cancel

(F7708) **$89**

hp PSC 2110

print/scan/copier



- Up to 4800-optimized dpi in colour or optional six-ink colour • Duty Cycle : 3,000 • Print Resolution, Black : 1200 x 1200 dpi, Colour : 1200 x 1200 dpi, up to 4800-optimized dpi using HP Premium Photo Paper • Scan Resolution, Optical: 600 x 1200 dpi • Flatbed scanner, 8-bit greyscale • copy speed, black: up to 14 cpm

(G0815) **$299**

Ask About...

EXTENDED HARRIS TECHNOLOGY WARRANTY

- ☐ Extend to a total of 3 Years Return to Base
- ☐ Extend to a total of 5 Years Return to Base
- ☐ Upgrade Return to Base of Warranty Extension to On-Site

hp PSC 2210

Print/Flatbed fax/Scan/ Copier



- Up to 4800-optimized dpi in colour or optional six-ink colour • digital camera memory card slots and easy to navigate control-panel buttons and proof sheet • Duty Cycle : 3,000 • Print Resolution, Black : 1200 x 1200 dpi • Colour : 1200 x 1200 dpi, up to 4800-optimized dpi, using HP Premium Photo Paper • Scan Resolution, Optical: 1200 x 2400 dpi • Copy speed, black: up to 17 cpm
- Fax: 33.6 kbps fax modem

(G1633) **$499**

hp officejet 4110 all in one

Print / Scan / Fax & Copy



- High speed faxing with 33.6kbps modem
- Up to 70 speed dials and 65 page memory
- Professional print up to 4800-dpi colour • Ideal for high resolution printing up to 600x600 dpi • Prints and copies up to 12ppm in black and 10 ppm in colour
- 100 sheet capacity input tray, 25 sheet output tray
- 20 pages Automatic Document Feeder
- USB 2.0 connectivity • Microsoft Windows 98, 98 SE, Me, 2000, XP; MacIntosh OS 9, OS X

(J4673) **$299**

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hp scanjets, photosmart printer & consumables

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Cash Back Offer Conditions Apply

***$25 Cash Back Offer** Buy any 2 genuine hp inks and receive a $25 cash back. Purchase 20 genuine hp inks and receive a bonus hp digital camera c320 as well as $250 cash back

****$100 Cash Back Offer** Buy any 3 genuine hp toners and receive a $100 cash back. Purchase up to 100 toners and receive a bonus hp colour laserjet 1500 as well as cash back.

Send proof of purchase & claim form to hp for redemption. See www.hp.com.au/supplies for details and Terms & Conditions

Offers Vaild between 23rd May,03 to 31st July, 03

JUL 46

hp scanjet 3570C

HP's Photo-Quality Dual Sensor CCD Technology Scanner with HP Memories Disc Creator Software



• Up to 1200dpi optical resolution • 48bit colour • USB • Scan 35mm negatives and slides with built-in adapter • 10-2000% scaling in 1% increments • Windows 98, 2000, Me, XP; PII, Celeron or compatible • Photo quality results for everything you scan • Easy one-touch scanning, copying and emailing.

(F4313) **$269**

hp officejet 6110

Professional Colour Communication



• Up to 19ppm in black and 15ppm in colour • Versatile flatbed and high scanning resolution using hp's unique CCD technology (600x1200dpi, 48 bit colour) • photoREt 3 colour layering technology • 4x6 borderless photos • 3.6kbps built in modem, faxes 6 seconds per page • 100 sheet capacity input tray, 50 sheet output tray • USB connectivity.

Rent* $7.16/wk (H0635) **$639**

hp officejet 7130



• up to 4800-optimised dpi in colour • hp photoREt 3 colour layering technology • drop-on-demand thermal inkjet Printing • language: HP PCL Level 3 Enhanced • Print up to 22 ppm mono, up to 8 ppm colour • 33.6kbps fax modem • Fax up to 3 seconds/page • 130 speed dials; • send PC faxes Scan up to 1200 x 4800 dpi optical resolution • up to 48-bit colour • 8-bit greyscale (256 levels of grey) Copy up to 22 cpm mono • up to 18 cpm colour • reduction/ enlargement: 25% to 400% • up to 99 maximum copies

Rent* $10.24/wk (H8976) **$914**

hp paper



hp q1952a- hp colourfast photo paper, 4R, 20 sheets (G0321) **$16**

hp q1951a- hp colourfast photo paper, A4, 20 sheets (G0319) **$28**

hp q1936a- hp premium inkjet paper A4 - 200 Sheets (D9329) **$35**

ink cartridges

Buy any 2 Get $25 Cashback Offer Conditions apply*



No 29 Black Inkjet Cartridge (21919) **$63**

No 45 Black Inkjet Cartridge (22643) **$65**

No 78 Tri Colour Inkjet Cartridge Large (97335) **$129**

hp toner

Buy any 3 Get $100 Cashback Offer Conditions apply**



hp c4092a LaserJet print Cartridge for hp 1100, 3200, 2500 page Toner (70459) **$128**

hp 92298a LaserJet Black Print Cartridge for 4/M, 4+/M+, 5/N/M 6800 page Toner (07995) **$195**

hp 92298x LaserJet Black Print Cartridge for 4/M/+/M+ /5/5M/5N 8800 Page Toner (42504) **$208**

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MFC-5100c Series Multifunction 5 in 1



- Colour Faxing (ITU-T.30E Fax Standard) • 14.4 kbps Modem
- Print colour up to 8 ppm, Mono up to 10 ppm, Fast Draft up to 12 ppm
- Resolution: Colour up to 2400x1200 dpi, Mono up to 1200x1200 dpi.
- 4 separate Ink cartridges • 100 Page Paper Capacity
- Parallel an USB Interface
- Multicopy with Stack and Sort Function
- CCD Scanner
- Scan to e-mail, OCR and Image key

MFC-5100c (E6354) **$498**

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MFC-5200c Series Multifunction 6 in 1



- Send or Receive black or colour faxes • 33.6Kbps high-speed fax modem
- Print up to 15 ppm black or 12 ppm colour printing
- Print up to 2400x1200 dpi photo quality output
- 100 Sheet Paper Cassette • 8 MB Memory
- Parallel and USB interfaces • Scan Optical resolution of 600x2400 dpi
- Includes ScanSoft™, PaperPort® and TextBridge® OCR software • Compact Flash™, Smart Media™, Memory Stick™ available

MFC-5200c Rent* $8.01/wk (H1394) **$715**

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MFC-9160 Series Multifunction 3 in 1



- Print up to 10ppm printing
- True 600 x 600 dpi laser output
- Up to 200 sheet paper tray
- Parallel and USB interfaces standard
- Copy up to 10 cpm copy speed
- Multi-copying up to 99 pages
- Scan up to 9600 x 9600 dpi (interpolated) resolution
- Includes ScanSoft™ PaperPort® and TextBridge® OCR software (for Windows® users only)

MFC-9160 Rent* $9.62/wk (E0646) **$859**

Ask About...

ETERNAL HARRIS WARRANTY

MFC-9180 Series Multifunction 5 in 1



- Fax up to 30 page Auto Document Feeder
- 14.4K bps high-speed fax modem
- Print Up to 10 ppm laser printing
- True 600 x 600 dpi laser output
- Up to 200 sheet paper tray
- Parallel and USB interface
- Copy Up to 10 cpm copy speed
- Scan Up to 9600 x 9600 dpi (interpolated) resolution
- Includes ScanSoft™ PaperPort® and TextBridge® OCR software (for Windows® users only)

MFC-9180 Rent* $11.08/wk (E0645) **$989**

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Think Twice... Especially when you make your next backup software decision.

Move to a better Backup Solution

- Fast, simple installation and administration
- Faster, more reliable backups and restores
- Affordable and scalable without sacrificing performance

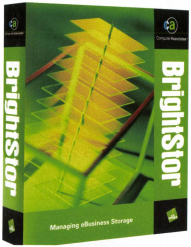
Why BrightStor ARCserve Backup v9?

- Install and backup out of the box
- Enhanced interface
- Choose between tape, optical disk, CD/RW, DVD/RW or even backup to disk to make backup and recovery fast and flexible
- Cross platform Manager for Windows, NetWare and Linux
- Full NAS/NDMP support – perform local backups at higher speed with zero impact on network traffic

Industry firsts with:

- Web-styled GUI
- Serverless Backup
- Open File Agent for Novell NetWare 6 NSS Volumes
- Image Option support for NetWare
- Ultra-quick installation
- Windows Server 2003 ready
- Offers Cross-Platform Support and Multi-Server Management/Monitoring from one console
- Award-winning integrated Antivirus technology embedded in the base product.

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Full (G4674) **$899**

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Powerful Information Delivery for the Web

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Crystal Reports 9 Advanced Edition



For Enterprise Developers and IT Professionals **the Advanced Edition gives you**:

- Rapid report integration and delivery into .NET, Java & COM applications
- Additional web flexibility for custom data access
- Runtime report design, modification, and deployment
- All the features of the Developer Edition

New in Advanced Edition: Crystal Enterprise 9 Standard

Full version (F9621) **$3,099** Upgrade (F9619) **$2,699**

Crystal Reports 9 Professional Edition



For IT Professionals, **the Professional Edition includes**:

- Powerful, fast report creation • Enterprise data connectivity
- New productivity tools including the report object repository & customisable templates
- Introductory license for web based reporting

Full version (F9616) **$765** Upgrade (F9613) **$399**

Also available:

Crystal Analysis 9 Professional	Full version (J2867)	**$765**	Upgrade (J2868)	**$399**
Crystal Reports 9 Developer	Professional (F9617)	**$920**	Upgrade (F9614)	**$539**

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Microsoft Windows Server

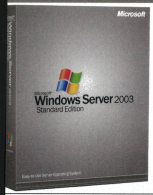
Microsoft Windows Server 2003

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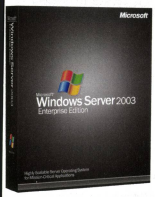
Windows Server 2003, Standard Edition



Windows Server 2003, Standard Edition is the network operating system for small organisations and departmental use. It delivers intelligent file and printer sharing, secure Internet connectivity, centralised desktop application deployment, and Web solutions that connect employees, partners, and customers. Windows Server 2003, Standard Edition takes the best of Windows 2000 Server technology and makes it easier to deploy, manage and use. The result is a highly productive operating system that is secure, reliable, and ready to use "out of the box," with features that provide robust availability and scalability.

Windows Server Standard Edition 2003 5 Client (I0357) **$2,099**

Windows Server 2003, Enterprise Edition



Built for medium to large businesses, Windows Server 2003, Enterprise Edition delivers the functions needed for enterprise infrastructure, line-of-business applications, and e-commerce transactions. Windows Server 2003, Enterprise Edition is a full-function operating system that supports up to eight processors and provides enterprise-class features such as 4-node clustering and up to 32GB of memory. This product is also available for 64-bit computing platforms.

Windows Server Enterprise Edition 2003 25 Client (I0360) **$8,039**

10 REASONS TO UPGRADE FROM NT 4.0

1	Identity Management via Active Directory	6	Any Device Application Access via Terminal Services
2	Many to One Management via Group Policy & Scripting	7	Server Clustering
3	At Least 2x Performance	8	Easy PKI and Kerberos Security
4	End User Productivity via Shadow Copy	9	World-class Application & Web Services Application Server
5	Robust, Scalable Web Server	10	Intelligent File Services (Distributed, Replicated, Encrypted)

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The Microsoft Office XP Family

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Microsoft® Office xp is the most significant version of Office ever released and redefines the relationship between people and software by delivering an exciting new set of experiences that provide a smarter way of working. Office xp delivers a **personal experience**, simplifying the way individuals work; a **collaborative experience**, enabling people to easily collaborate on documents and to work more effectively with others and an **organisational experience** by allowing organisations to increase their overall productivity.

PRODUCT DESCRIPTION	Office xp STANDARD	Office xp PROFESSIONAL	Office xp DEVELOPER	Office xp PROFESSIONAL OEM	Office xp SMALL BUSINESS OEM
Word 2002	✓	✓	✓	✓	✓
Excel 2002	✓	✓	✓	✓	✓
Outlook 2002	✓	✓	✓	✓	✓
PowerPoint 2002	✓	✓	✓	✓	
Access 2002		✓	✓	✓	
Publisher 2002				✓	✓
FrontPage 2002			✓		
Developer Tools			✓		
Part Number	(C2082)	(C2084)	(C2772)	For licensing and Academic pricing Call our team on 1300 13 9999	
Full Version:	$920	$1,119	$1,515		
Part Number	(C2083)	(C2085)	(C2773)		
Upgrade:	$450	$625	$1,049		

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Microsoft® Office:mac v. X

Just what you need. Just for Mac OS X.



- **Modern user interface.** The user interface within Office v. X for Mac has been completely redesigned to include a bold and classy new Aqua visual appearance that is a perfect representation of what an application running on Mac OS X should look and feel like.
- **Communication is a snap.** E-mail is made even easier in Entourage X by allowing connections to Microsoft® Exchange servers, Hotmail and Mac.com so users can more efficiently manage e-mail online and off. With the integrated and improved Entourage calendar, easily organise your schedule, and set reminders for important events and projects.
- **File sharing.** Compatible with Office 97, 2000, and Microsoft® Office XP so you can share your work and files with anyone whether they use a Mac or PC. (Also compatible with Office 98 Macintosh Edition and Office 2001 for Mac).
- **Get started fast.** Easily access customisable templates for resumes, catalogue, newsletters, calendars, and more from the Project Gallery. The Clip Art Gallery, including hundreds of images, provides tools to make working with graphics quick and easy.

Full product (G1055) **$899** **Upgrade** (F8238) **$549**

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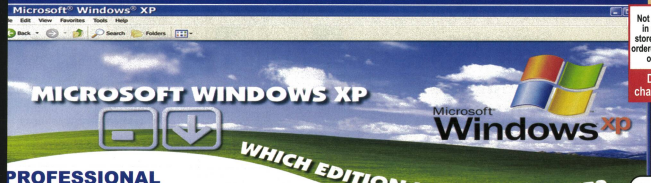
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Microsoft Windows



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PROFESSIONAL

Windows® XP Professional has all the features of Windows® XP Home PLUS many added features. With its fresh new look, to its intuitive task-based design, XP makes it easier than ever to use your computer. Built on the solid foundation of Windows® 2000, Windows® XP Professional offers greater reliability, security and compatibility than ever before in a business operating system.



Windows® XP Professional is right for me if

- I have a small business or I am an advanced user.
- I want to set up a business network or I need to join my PC (or laptop) to a domain on a server based network.
- I need enhanced security and privacy to protect my business data.
- I want to get a real-time communication tool for collaborating with customers and business partners online.

Full	Upgrade (from Win 98 or above)
(C9884) **$599**	(C9885) **$415**

HOME EDITION

Windows® XP Home Edition gives you the freedom to discover the possibilities of your home computer. It makes your computer smarter, yet simplified and keeps you connected to what's important to you, friends, family, the Internet and much more. Windows® XP Home Edition offers greater dependability and privacy than ever before in a home operating system.



Windows® XP Home is right for me if

- I have a home computer.
- I want to experience improved performance for my computer.
- I want to enjoy the best in digital music.
- I would like to experience personal entertainment and gaming.
- I would like increased security & faster internet access.

Full	Upgrade
(C9882) **$405**	(C9883) **$215**

msdn

MSDN® provides priority access to essential resources for developers, including timely delivery of everything you need to build XML Web services and applications. Through MSDN® Subscriber Downloads and automatic shipments, you receive the latest Microsoft® technologies and information as soon as they release. With developer-licensed versions of Microsoft® operating systems and Microsoft® enterprise servers (Enterprise or Universal subscriptions only) you can fully test the broadest range of applications.

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Professional:
Visual Studio .NET Professional Rapidly build next generation Internet applications that target any Internet device and integrate with any platform. MSDN Professional subscribers stay up to date with priority access to the latest versions of Visual Studio .NET

Full (D1932) **$2,430** Upgrade (D1903) **$1,790**

Enterprise:
Visual Studio .NET Enterprise Developer Use the powerful enterprise lifecycle platform for rapidly building Web Services and applications that target any device. MSDN® Enterprise subscribers stay up to date with priority access to the latest versions of Visual Studio .NET.

Full (D3003) **$4,555** Upgrade (D9365) **$3,340**

Universal:
Visual Studio .NET Enterprise Architect Use the comprehensive tool for designing XML Web services and providing architectural guidance for development teams. MSDN® Universal keeps you on the cutting edge with priority access to the latest versions of Visual Studio .NET.

Full (D1749) **$5,379** Upgrade (D1661) **$4,770**

Microsoft Plus! Digital Media Edition for Windows XP

For Windows XP



Microsoft Plus! Digital Media Edition delivers exciting new ways to share your photos and enjoy your music and home movies. Harness the power of Microsoft Windows XP to showcase and manage media on your PC and Pocket PC.

(H1492)

$48

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Symantec AntiVirus Small Business Solutions	 Small Business Edition	 Small Business Edition plus AV Filtering for MS Exchange	 Small Business Multi-Tier Protection	 Symantec Client Security
Multipacks 5 & 10 users	✓	✓	✓	✓
Desktop AV Protection	✓	✓	✓	✓
Network Server Protection	✓	✓	✓	✓
Administrative Settings	✓	✓	✓	✓
Management Console	✓	✓	✓	✓
1 Year Upgrade Insurance	✓	✓	✓	✓
1 Year Technical Support	✓	✓	✓	✓
Desktop Firewall Protection				✓
Intrusion Detection				✓
MS Exchange Mail Server Protection		✓	✓	
Gateway AV Protection			✓	
Lotus Domino Mail Server			✓	
Protection	(G0215)	(G0218)	(G4537)	(G1129)
5 User	HOT PRICE $399	HOT PRICE $499	$1,109	$1,265
10 User	(G0216) HOT PRICE $699	(G0219) HOT PRICE $899	(G4536) $1,955	(G1130) $2,225
25 User	(G0217) HOT PRICE $1,549	(G0220) HOT PRICE $1,899	N/A	N/A

Symantec AntiVirus™ Small Business Edition

A complete, license-in-a-box solution for workstations and network servers

- One-year maintenance agreement provides technical support and product updates at no additional cost*
- Centralised policy management makes installation, administration, and protection of product settings ideal for small business
- Protects workstations and network servers against viruses, Trojan horses, malicious ActiveX code, and Java applets
- Digital Immune System™ automation delivers fast, reliable, and hands-free virus detection, analysis, isolation and repair
- Schedulable LiveUpdate™ automatically delivers new virus definitions—now with reduced definition file size for rapid updating
- Exclusive Symantec's AntiVirus engine technology updates scanning and virus repair engines without having to redeploy software
- Extensive platform support, now including Netware 6.0
- Backed by Symantec™ Security Response, the world's leading Internet security research and support organisation

HOT PRICE **5 User** (G0215) **$399**

HOT PRICE **10 User** (G0216) **$699**

HOT PRICE **25 User** (G0217) **$1,549**

* Technical support for the five-license pack is limited to a set number of occurrences per year.

ALSO AVAILABLE:Symantec AntiVirus Small Business Edition with Symantec AntiVirus/Filtering for Microsoft Exchange. In addition to virus protection for workstations and network servers, this special license pack also contains email protection for your Microsoft Exchange servers and clients

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Super Tax Time bundle: (J2886) **$99**
Norton AntiVirus 2003 and Norton Personal Firewall 2003

Deluxe Tax Time Bundle: (J2887) **$115**
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Sold Individually: Norton Antivirus 2003
Single User (F9859) **$89**
5 User (G2239) **$259**
Norton Personal™Firewall 2003 (G0282) **$85**

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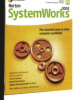
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Norton SystemWorks™ 2003



Is the smartest way to solve computer problems. It includes award-winning Symantec products and additional utilities to keep your PC running at its best.
Includes:
- Norton AntiVirus™ 2003
- Norton Utilities™
- Norton CleanSweep™

Standard (F9860) **$125**

Norton SystemWorks™ 2003 Professional



Provides advanced problem-solving solutions to maximise PC performance, **includes full version of Norton Ghost™ 2003.**
Includes:
- Norton AntiVirus™ 2003
- Norton Utilities™
- Norton CleanSweep™
- GoBack Personal Edition

Professional Edition (F9863) **$165**

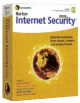
Norton Internet Security™ Professional



Protects you and your business from online threats. It keeps your PC safe from viruses and hackers and safeguards your privacy.
Includes:
- Norton AntiVirus™Pro
- Norton™Privacy Control
- Norton™ Spam Alert and
- Norton™ Productivity Control

Professional (G0280) **$155**

Norton Internet Security™ Standard



Provides essential protection from viruses, hackers, and privacy threats.
Includes: Norton AntiVirus™
- Norton™Personal Firewall
- Norton™ Spam Alert and
- Norton™ Parental Control

Single User (G0279) **$119**
5 User (G1162) **$369**

Norton pcAnywhere™ V10.5



Is the world's leading remote control software. Encryption and authentication ensure secure access to remote computers. PcAnywhere™ also works with cable & DSL modems for faster remote connections.

Host & Remote (D8088) **$239**
V10.5 / 5 User (D5935) **$479**

Norton Ghost™ 2003



Protects your data from computer disasters. The intuitive Windows® interface makes it easy to create regular backups of your hard drive. You don't even need to make a boot disk. File restoration is simple from the comprehensive disk image.

Single User (F9865) **$135**

Norton Winfax Pro V10.02



Easily integrates with key business applications to simplify management of client and customer interactions. Send or forward faxes via email, enhance image quality of outgoing faxes easily, add a signature to outgoing faxes, drag and drop faxing.

Standard (D6011) **$119**

Norton Personal™ Firewall 2003



Keeps hackers out and personal data in. Secure your PC today with Norton Personal™ Firewall, your maximum defence against hackers and privacy threats.

5 User (G1149) **$395**
Personal Edition (G0282) **$85**

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BUNDLE
Internet Security v 5.0 + QuickClean v 3.0

WIN (J2902) **$135**

BUNDLE
Firewall v 4.0 + Parental Controls v 1.0



WIN (J2901) **$75**

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VirusScan Professional Edition v 7.0

Stop viruses and keep your PC safe with McAfee VirusScan Professional! When you're surfing the Internet, there's more to worry about than just viruses. VirusScan software destroys threats at all entry points to your PC including email, the Internet, and even synchronisation with your PDA. VirusScan includes extra firewall protection to keep your computer safe from Internet-based threats. VirusScan Professional Edition includes quick cleanup of your PC, complete shredding for privacy, and more! VirusScan Home Edition also available, for product description visit our website: www.ht.com.au/cat/mcafee

Professional Edition (G1246) **$89**

Home Edition (G1811) **$75**

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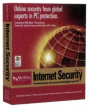
SpamKiller v 4.0



Stop those unwanted emails. McAfee SpamKiller quickly and easily stops spam from polluting your inbox. SpamKiller gives you ultimate control over your email by filtering out unwanted email while delivering the email that you want to receive. It helps stop spammers by notifying the sender's mail service of the offensive email.

WIN (I0297) **$45**

Internet Security v 5.0



Feel free to enjoy the vast wealth of information and entertainment the Internet has to offer with the extensive privacy and security protection provided by McAfee Internet Security. Incorporating McAfee's award-winning technologies, McAfee Internet Security provides one of the most comprehensive sets of privacy and security tools you can buy.

WIN (G1646) **$99**

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Firewall v 4.0



Protect yourself while online with the advanced security of McAfee Firewall. Easy-to-use, yet highly secure, McAfee Firewall safeguards your PC's connection to the Internet whether you connect via DSL, cable modem, satellite, or dial-up. McAfee Firewall gives you the powerful tools you need to control the communications into and out of your PC.

WIN (G1229) **$45**

Parental Controls v 1.0



McAfee Parental Controls helps parents protect their children from the unknown dangers of the Internet. It lets parents manage how each child can communicate across the Internet. McAfee Parental Controls includes child-specific settings for web pages, chat filtering, objectionable word filtering, online time limits, and more!

WIN (I0354) **$49**

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What the web can be



STUDIO MX PLUS

The essential suite of tools for building websites and rich internet applications. Includes Flash MX, Dreamweaver MX, Fireworks MX, FreeHand MX, ColdFusion MX Developers Edition, Flash 6 player, DevNet Resource Kit Special Edition and Contribute.

FULL VERSION WIN (H2300) **$1,715**



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FLASH MX COMMUNICATION SERVER PROFESSIONAL

Develop the next generation of online communications, deliver multi-way audio, video, and real-time data in your websites and rich internet applications. Change the way we communicate and collaborate online. Create engaging presales applications that integrate audio, video, text, chat, and enterprise data.

PROFESSIONAL EDITION WIN (I0216) **$7,799**

PERSONAL EDITION WIN (I0215) **$799**



FLASH MX

Provides everything you need to create rich Web content and powerful applications. From designing motion graphics to building data-driven applications. Tools to deliver the best user experience across multiple platforms and devices.

FULL VERSION WIN (E4014) MAC (G3145) **$935**



DREAMWEAVER MX

Create, build and manage websites and Internet applications. Enjoy the renowned visual layout tools and the rapid web application development features of Dreamweaver UltraDev and the extensive code-editing support of Macromedia HomeSite.

FULL VERSION WIN (F0137) MAC (H9763) **$759**



FREEHAND MX

Concept and design visually-rich graphics for print and web with Macromedia FreeHand MX, the multi-publishing design solution with powerful illustration and drawing tools and an open, streamlined workflow.

FULL VERSION WIN (H9758) MAC (H9759) **$729**



DEVNET SUBSCRIPTIONS

A new service designed to provide Macromedia professionals with the powerful technologies and resources to create and deliver exceptional digital experiences.The service is available in two tiers:Macromedia DevNet Professional and DevNet Essentials.

PROFESSIONAL WIN (J1959) **$2,759**

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COLDFUSION MX SERVER PROFESSIONAL

Easily build rich Internet applications that integrate with databases, XML, web services, Macromedia Flash, and more. ColdFusion MX empowers developers with a productive scripting environment and integrated search and charting capabilities. Deploy on industry-standard operating systems and harness the power of the Java and .NET platforms with the legendary ease of use of ColdFusion.

FULL VERSION WIN (F0364) **$2,249**



DIRECTOR MX

Combine any media, deliver anywhere and reach everyone with Director MX, the powerful multimedia-authoring solution. With Director, you can build rich accessible content that delivers real results, integrating interactive audio, video, bitmaps, vectors, text, fonts, and more. Work more effectively within the familiar Macromedia MX user interface and take advantage of unprecedented Macromedia Flash MX integration.

FULL VERSION WIN (G6770) MAC (H9767) **$2,199**



MACROMEDIA CONTRIBUTE

Now anyone can update, add and publish content to existing websites without knowing HTML. With Macromedia Contribute non-technical users can update any HTML website including sites built in Dreamweaver, Frontpage, and other tools, without affecting the quality of existing HTML code. This means spending less time on content maintenance while retaining control over website style, layout, permissions, and code. Contribute is a stand alone product that also works seamlessly with Dreamweaver MX so you can

FULL VERSION WIN (G4726) **$199**

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NEW MAGIC

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(D4410)
$225

ACID DJ 3.0
(D4342)
$115

Sound Forge 6 Academic
(G2979)
$479

ACID Pro 4 Academic
(G4214)
$479

Video Factory Academic
(G4213)
$145

Hauppauge DVB-S NExus Satellite reciever
Rent* $6.66/wk
(G4246)
$595

Vegas® 4.0

REALTIME PREVIEW THROUGH FIREWIRE

Vegas® 4.0 is the professional's choice for video editing, audio production, compositing, titling and advanced encoding on the PC platform. With its sleek, intuitive interface and powerful video and audio production tools, Vegas provides a complete and integrated solution for digital video production, audio recording, editing and mixing, streaming content creation, and surround sound production. Vegas 4.0 provides real-time previewing of effects and transitions from the timeline without needing to render, through any OHCI firewire card - even on a notebook!



(H1946) **$899**

Vegas® 4.0 + DVD

Vegas 4 + DVD includes DVD Architect, a powerful DVD Authoring tool which includes a Dolby Digital AC3® Encoder!

DVD Architect works seamlessly wit Vegas 4.0, providing video profession and DVD producers with a complete solution for DVD authoring. Vegas 4. markers are automatically recognize and imported into DVD Architect as chapter points.

(H1952) **$1,29**

CD Architect™ V5



Produce professional audio CDs to Red Book specification with Sonic Foundry's new CD Architect 5.0. Perform full PQ code editing, trim events from full-length media and add as new tracks, import regions from Sound Forge as tracks, master audio by applying over 20 real-time DirectX® effects to events and the master output, and perform disc-at-once CD burning. Shipping with Noise Reduction 2.0 for a limited time!

(G9002) **$319**

TV Tuner Card & Video Recorder

PVR 350 now with TV Video Out! Now you can record TV programs in DVD quality and play them back on your TV! Use your PC as a true Digital VCR! PVR 350 includes FM tu PVR 250 and PVR USB offers playback to your PC display.



Hauppauge PVR 25
(G5990) **$42**

Hauppauge PVR 35
(H3814) **$52**

Sound Forge 6

Edit, Record, Process & Encode Audio on your PC



This industry-standard application is perfect for audio editing, recording, effects processing and rich media encoding. Version 6 continues to improve by adding features that make it even faster and more powerful than ever!

Sound Forge 6 (B8616) **$585**
Also available
Sound Forge Studio 6 (G3738) **$225**

Video Factory 2.0



VideoFactory 2.0 allows you to captu and edit digital video on your PC. It's perfect for home movies, web videos, music videos, weddings, corporate presentations and much, much more. It' packed with 115 effect presets and 170 customisable transition presets that app in real-time or you can customise your own! Supports OHCI DV cards.

(D1566) **$21**

Hauppauge TV USB

Watch TV on your Notebook



The Hauppauge TV USB and TV USB FM allow you to watch TV on your notebook using its USB interface. The compact external unit also accepts video from a VCR or camera. Basic capturing functionality is also provided.

TV USB (89066) **$255**
TV USBFM Radio (98455) **$309**

Hauppauge TV GO

Watch TV on your Desktop



The Hauppauge TV Go and TV Go FM allow you to watch TV on your desktop, either in a window or full screen. Both models feature Stereo audio, teletext capability, VCR input as well as basic capturing. FM model comes with a free Remote control!

(89063) **$155**
(H1477) **$214**

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No Limits Realtime Editing

CANOPUS ACEDVio - One card for all Video Editors

ACEDVio is the world's only analog and DV editing card that is completely compatible with hundreds of video editing applications and all widely used video equipment.

- Provides analog and DV I/O: Final Cut Pro, XpressDV, Premiere, Vegas, Edition, Media Studio Pro, and Windows Movie Maker.
- Connects to all widely used analog and DV cameras and decks including: VHS, S-VHS, Hi-8, Digital8, DV and DVCAM (PAL & NTSC standards support).



ACEDVio

ACEDVio (J4950) **$999** Includes: Sonic Foundry® Vegas® 4.0

Canopus DVRaptor RT2 sets a new standard in performance and price by providing render-free realtime multi-track DV editing. With DVRaptor RT2 there is no rendering and no waiting to enjoy high-quality realtime DV output of 3D transitions, video tracks, filters, titles and graphic layers. Includes Ulead DVD Workshop SE.



DVRaptor RT2

DVRaptor RT2 (H2263) **$1,080**

DVRaptor RT2 with ADVC50 (H2264) **$1,399**

DVRaptor RT2/ADVC50 with PowerTools (H2265) **$1,499**

DVRaptor RT2 with Power tools (H2266) **$1,199**

EZDV SE Ultimate Bundle

Complete analogue and DV editing solution with DVD authoring. EZDV is a fast friendly easy-to-use DV capture and editing solution using high quality Canopus technology. Includes: Canopus EZDV SE, ADVC-100 & DVD Workshop SE software*



EZDV SE

Ultimate Bundle (G9911) **$978**

EZDV SE (F0859) **$349**

DVStorm2 delivers the industry's highest-quality DV and MPEG, breakthrough realtime performance and a professional, stable studio environment.

- Fast on board MPEG encoding
- MPEG tools for capture, cutting and re-encoding.
- Includes Ulead's DVD Workshop SE.
- 3D Picture in Picture Controls.
- Additional filters
- "One-pass" scene capture utility.



DVStorm2

DVStorm2 PLUS inc. DVStorm Bay & Adobe Premiere 6.5 (G9794) **$2,799**

(G1647) **$2,199**

Professional Editing

EDIUS - Professional Editing Software

Canopus's much-anticipated professional editing software platform has arrived

- Floating window user interface for easy workspace customization.
- Realtime video filters & 3D transitions
- Unlimited realtime video and audio tracks
- Unlimited realtime graphic and title layers
- Output MPEG-1&2, Windows Media /RealVideo/ Quicktime.
- EDIUS directly supports and requires either DVStorm, DVStorm2, DVRex RT or DVRex RT Professional.



EDIUS

(J4993) **$599**

Convert to DV with the World's Best Technology

Award-winning DV Technology	Locked Audio Support	NTSC and PAL Compatible	Convert Your S-VHS, Hi8 or Other Analogue Videotapes to DV

ADVC-100 - Convert analog to DV and back in realtime

Featuring analog inputs on the front and back, colour bar reference signal generator and automatic input signal detection, ADVC-100 is an affordable, professional converter.

The ADVC-100 is compatible with DV and OHCI capture cards for the PC. No need to install drivers or any applications.





ADVC100 Advanced Digital Video Converter

(D4514) **$699**

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- Copy DVD videos onto CD
- Back-up your favourite PC & console game disks
- Customise your DVD videos
- Copy DVD Video or disc images from your hard drive to disc
- Burn multiple CDs or DVDs simultaneously

(H9521) **$99**

INSTANT CD / DVD

NEW



- Instant copy: CD/DVD copy
- Instant Backup: to backup & restore your files & drives
- Instant Write: lets you use your CD-R, CD-RW & DVD RAM like a floppy
- Instant Music: music arranger program
- Expression: CD/DVD authoring fo still images & videos & CD label designer
- Instant Drive: virtual CD-ROM drive

(H9522) **$149**

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The complete home movie-making package for video editing novice

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MOVIE BOX

- Includes full version of Studio 8 editing software
- Designed by F.A. Porsche
- Capture and output Analogue and Digital video
- Simply connects to a FireWire port on your PC or Laptop



"Also doubles as an AV/DV Convertor"

Rent* $6.70 /wk (J2405) **$598**

STUDIO DELUXE

- Analogue & Digital Video editing & DVD authoring hardware software solution
- Includes full version of studio 8 editing & DVD authoring software
- Includes analogue and DV breakout box for video/ audio connections
- Includes additional 3D Hollywood FX transitions



Rent* $6.66/wk (F9330) **$595**

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EDITION 5 DV



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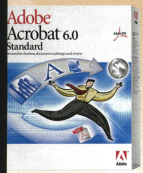
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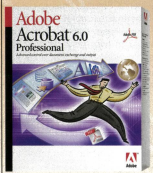
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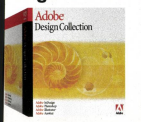
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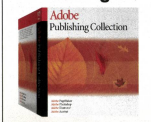
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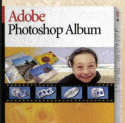
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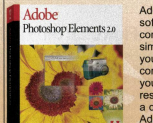
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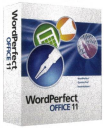
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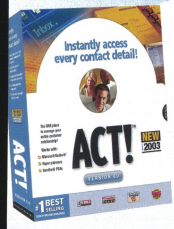
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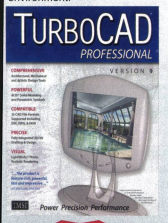
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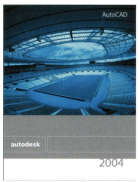
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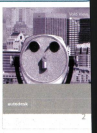
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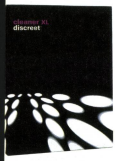
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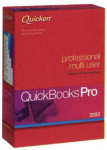
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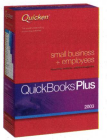
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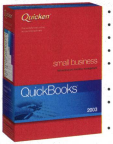
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Mini Slim Case
Integrated Ethernet
Integrated Sound
Newman Black Keyboard/Mouse
Windows XP Home

Upgrade Bundles

Adelong Upgrade bundles represent great value for users who need a cost effective way to get more performance out of their current PC hardware. Choose a bundle and the processor of your choice to gain instant computing power!

SOHO Value - Processor, Motherboard, Casing

AMD

MSI KM2M Combo Motherboard
- 2 x DDR266, Integrated Video
- Integrated 6-Channel Audio and LAN
- 1 x AGP(4x), 3 x PCI, 6 x USB 2.0

AMD Athlon XP2000	$315 SPADE334
AMD Athlon XP2200	$329 SPADE335
AMD Athlon XP2400	$355 SPADE340

INTEL

MSI MS-6533XG-L Motherboard
- 2 x DDR333, Integrated Video
- Integrated 6-Channel Audio and LAN
- 1 x AGP(4x), 3 x PCI, 6 x USB 2.0

Intel Celeron 1.8Ghz	$309 SPADE337
Intel Celeron 2.0Ghz	$335 SPADE338
Intel P4-2.4Ghz	$479 SPADE339



PERFORMANCE GAMING - Processor, Motherboard, Graphics, Casing

AMD

Gigabyte GA-7VAC Motherboard
- 3 x DDR333
- 1 x AGP(4x), 5 x PCI, 6 x USB 2.0
- Integrated 6-Channel Audio

Winfast A340TD
- nVIDIA GeForce FX5200 Chipset
- 128MB DDR RAM
- TV-Out + DVI

AMD Athlon XP 2400	$515 SPADE257
AMD Athlon XP 2800	$695 SPADE258
AMD Athlon XP 3000	$755 SPADE370

INTEL

Gigabyte GA-8IS800 Motherboard
- 3 x DDR333
- 1 x AGP(4x), 5 x PCI, 6 x USB 2.0
- Integrated 6-Channel Audio

Winfast A340TD
- nVIDIA GeForce FX5200 Chipset
- 128MB DDR RAM
- TV-Out + DVI

Intel P4-2.67Ghz	$745 SPADE261
Intel P4 2.8Ghz	$845 SPADE262
Intel P4 3.06Ghz	$1099 SPADE263

Adelong Special

The Adelong Special featuring the Intel Celeron 1.7Ghz Processor is an excellent blend of power and performance at an incredibly low price! Suitable for first time buyers or as a simple replacement PC.

$749 SPADE201



*Picture for illustration purposes only

Intel Celeron™ 1.7Ghz
256MB DDR
40GB Hard Drive
1.44MB Floppy Drive
Integrated Video Accelerator
52X CDROM
17" Monitor
ATX MidiTower Case
Integrated Ethernet
Integrated Sound
Keyboard, Scroll Mouse, Speakers

With REDhat Linux v8.0 **$799**
With MS Windows XP Home **$899**

Mittoni Tripper Storage Case

Compatible with 9.5mm thick 2.5" IDE hard drives. A portable storage solution that allows the direct transfer of data from a CompactFlash card. An informative LCD screen to accurately display various working status, including file transfer confirmation, space usage, file names, date, time. Best of all, the Tripper is equipped with fast USB 2.0 port, which can transfer files from its internal hard drive to computers at a speed up to 480Mbps. It is also fully compatible with any USB or USB 1.1 port on your PC.



$259 CADDE100

20GB Tripper **$449** HDADE040

40GB Tripper **$549** HDADE041

4 in 1 CompactFlash Adapter

This adapter accepts all on-die flash cards including MS, SD, SM and MMC. The 4-in-1 CompactFlash Adapter is perfect for PDA's and other peripherals that only accept CompactFlash.

$55 MSADE088



Creative Muvo MP3 Player

With its unique 2-piece design, this tiny player offers fantastic sound quality as an MP3/WMA player and unparalleled versatility as a data storage device. It's so easy to use, you don't even need cables or software.



64MB **$255** MMCRE090

128MB **$339** MMCRE091

Pinnacle Studio DV Clip

The cheapest way to edit movies from your DV Cam!

Make movies in minutes with easy drag and drop editing. Kit includes PCI to FireWire card and Pinnacle Studio V8 LE software.



$135 MYPIN035

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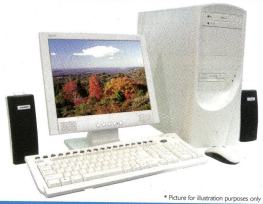
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SOHO Advantage

- 256MB DDR RAM
- 40GB HDD
- 1.44MB Floppy Drive
- Integrated Video Accelerator
- 17" CRT Monitor
- 52X CDROM
- ATX MidiTower Case
- Integrated Ethernet
- Integrated Sound
- Keyboard, Mouse, Speaker
- MS Windows XP Home Edition

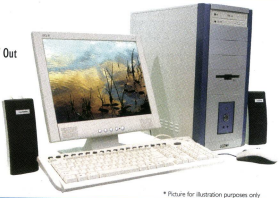


* Picture for illustration purposes only

AMD Athlon™ XP 2000	**$949**	SYADE325
AMD Athlon™ XP 2200	**$975**	SYADE326
AMD Athlon™ XP 2400	**$999**	SYADE327
Intel Celeron™ 1.8Ghz	**$955**	SYADE328
Intel Celeron™ 2.2Ghz	**$975**	SYADE329
Intel Pentium™ 4 2.4Ghz	**$1099**	SYADE330

Power Advantage

- 256MB DDR RAM
- 40GB HDD
- 1.44MB Floppy Drive
- 64MB GeForce4 MX440SE with TV Out
- 17" CRT Monitor
- 52X CD-ROM
- ATX MidiTower Case
- Integrated 6-Channel Sound
- Keyboard, Mouse, Speakers
- MS Windows XP Home Edition

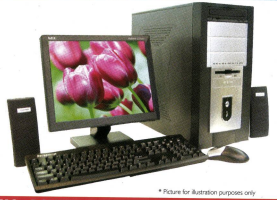


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AMD Athlon™ XP 2400	**$1050**	SYADE331
AMD Athlon™ XP 2600	**$1095**	SYADE332
AMD Athlon™ XP 2800	**$1295**	SYADE333
Intel Pentium™ 4 2.4Ghz	**$1199**	SYADE334
Intel Pentium™ 4 2.67Ghz	**$1275**	SYADE335
Intel Pentium™ 4 3.06Ghz	**$1695**	SYADE336

Gamer Advantage

- 512MB DDR RAM
- 40GB HDD
- 1.44MB Floppy Drive
- 128MB ATI Radeon 9000 PRO II
- 17" CRT Monitor
- 16X DVD-ROM
- ATX MidiTower Case
- Integrated 6-Channel Sound
- Altec Lansing AVS300 Speakers
- PS/2 Multimedia Keyboard
- USB Optical Mouse
- MS Windows XP Home Edition



* Picture for illustration purposes only

AMD Athlon™ XP 2400	**$1395**	SYADE337
AMD Athlon™ XP 2700	**$1475**	SYADE338
AMD Athlon™ XP 2800	**$1595**	SYADE339
Intel Pentium™ 4 2.4Ghz	**$1575**	SYADE340
Intel Pentium™ 4 2.67Ghz	**$1645**	SYADE341
Intel Pentium™ 4 2.8Ghz	**$1755**	SYADE342

UPGRADES FOR SOHO, POWER & GAMER SYSTEMS

Upgrade to 512MB DDR RAM	**$65**	Upgrade to 15" LCD Monitor	**$355**		
Upgrade to 80GB HDD	**$45**	Upgrade to 17" LCD Monitor	**$595**	Upgrade to Multimedia KB & Optical Mouse	**$35**
Upgrade to 120GB HDD	**$99**	Upgrade to 19" CRT Monitor	**$175**	Add 10/100 PCI Ethernet Adapter	**$15**
Upgrade to 16X DVD-ROM	**$45**	Add Internal 56K PCI Modem	**$30**	Add 52x24x52 CDRW	**$89**

OEM Software Options on all Systems

Upgrade to MS Windows XP Professional **$125** | Add MS Office XP Professional **$475** | Add Norton Anti-Virus 2003 **$39**

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- ☑ FREE e-mail account
- ☑ FREE Personal web space

PLAN	Monthly Access Fee	Included Hours Per Month	Excess Usage Charge
Light	$5.50	10 hours	55¢ per hour
Quarterly	$22.00	Unlimited	NIL

• Light Plan: $30.00 deposit, the extra hours must be paid at the next period or within 7 days after the period finished
• Quarterly Plan: No deposit required, charged quarterly in advance, total charge $66.00

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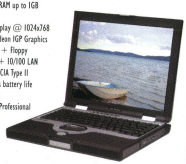
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Thursday	9:00am - 7:00pm
Weekends	10:00am - 4:00pm

Compaq Notebooks

EVO N1015V

The Compaq Evo N1015v is an affordable notebook without compromising on performance or features.

- AMD Athlon 1400 +
- 256MB DDR RAM up to 1GB
- 20GB HDD
- 13.3" TFT Display @ 1024x768
- 16MB ATI Radeon IGP Graphics
- 24X CD-ROM + Floppy
- 56K Modem + 10/100 LAN
- 2 x USB, PCMCIA Type II
- Up to 3 hours battery life
- Weighs 2.9kg
- Windows XP Professional



$1795 NBCOM095

EVO N1020V

Simplicity and performance at exceptional value.

- Intel Pentium 4 2Ghz
- 256MB DDR RAM (1GB Max)
- 20GB Hard Drive
- 32MB ATI Radeon IGP Graphics
- 14.1" TFT Screen @ 1024x768
- 24X CD-ROM + Floppy
- 56K Modem & 10/100 LAN
- 2 x USB, 1 x IEEE1394, PCMCIA
- Over 2 hours battery life
- Weighs 3.1Kg
- Windows XP Professional



$2495 NBCOM096

Bonus Slim Case

EVO N800V

The Evo N800V provides the performance the user demands and the mobility a user desires.

- Intel Pentium 4-M 2.0GHz
- 256MB DDR RAM up to 1GB
- 40GB HDD
- 15" TFT Display @ 1400x1050
- 64MB ATI Radeon 7500 Graphics
- 24x10x24xB CDRW/DVD
- 56K Modem + 10/100 LAN
- 2 x USB 2.0, PCMCIA Type II, IR
- Up to 3.5 hours battery life
- Weighs 2.7kg
- Windows XP Professional



$3495 NBCOM097

Intel Pentium 4-M 1.7GHz

$3045 NBCOM098

Acer Notebooks

2 HOUR WARRANTY EXPRESS SERVICE

TravelMate 234XC

Plenty of performance with outstanding connectivity, wrapping essential computing tools into one convenient package.

- Intel Celeron 2.2GHz
- 256MB DDR RAM up to 1GB
- 20GB HDD
- 14.1" TFT Display @ 1024x768
- Intel Graphics
- 24x10x8 +8 CDRW/DVD + Floppy
- 56K Modem, 10/100 LAN
- 2 x USB2.0, PCMCIA Type II/III
- Up to 2.5 hours battery life
- Weighs 3kg
- Windows XP Home



$2395 NBACE040

128MB DDR + 24X CD-ROM

$2045 NBACE042

Bonus TravelSlim Polyester Case

TravelMate 284XC

Specially designed for high-intensity work, helping you to handle the assortment of demanding projects you face, with speed and efficiency.

- Intel Pentium 4-M 2.2GHz
- 256MB DDR RAM up to 1GB
- 30GB HDD
- 14.1" TFT Display @ 1024x768
- 64MB Intel Graphics
- 24x10x8 +8 CDRW/DVD + Floppy
- 56K Modem, 10/100 LAN
- 2 x USB2.0, PCMCIA Type II/III
- Up to 2.5 hours battery life
- Weighs 3kg
- Windows XP Home



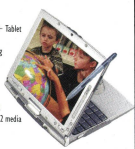
$2795 NBACE041

Bonus TravelSlim Polyester Case

TravelMate C104Ti Tablet PC

A convertible Tablet PC with a rotatable screen, voice and pen input, wireless connectivity, advanced security and a lightweight ultra portable design.

- Intel Mobile PIII 900Ghz CPU
- 256MB PC133 SDRAM
- 40GB HDD
- 10.4" TFT with 180° rotation + Tablet Stylus Pen
- 8MB VRAM Graphics supporting 1024x768
- USB Slimline CD-ROM
- 56K Modem, 10/100 LAN, 802.11b Wi-Fi LAN
- 2 x USB, IEEE1394 FireWire, IR
- PCMCIA Type II, SmartCard + 2 media
- Up to 3.5 hours battery life
- Weighs 1.4kg
- Windows XP Tablet PC Edition



$3499 NBACE021

Bonus Leather Cover

Toshiba Notebooks

Satellite 1130

Exceptional features and functionality packed into an affordable price, the Satellite 1130 is perfect for small business or home office users.

- Intel Mobile Celeron 1.8Ghz
- 256MB DDR RAM up to 1GB
- 30GB HDD
- 14.1" TFT Display @ 1024x768
- 16MB Intel 852GM Graphics
- 8X DVD-ROM
- 56K Modem + 10/100 LAN
- Integrated Wi-Fi Antenna
- 3 x USB, PCMCIA Type II/III
- Up to 3 hours battery life
- Weighs 2.8kg
- Windows XP Professional



$2195 NBTOS125

Bonus Carry Case

Satellite 2410

Combining the right mix of performance and user features, the Satellite 2410 lets you power through your day wherever you choose to work or play.

- Intel Pentium 4-M 2.0GHz
- 256MB DDR RAM up to 1GB
- 30GB HDD
- 14.1" TFT Display @ 1024x768
- 16MB nVidia GeforceR 420GO
- 8X DVD
- 56K Modem, 10/100 LAN
- Integrated Wi-Fi Antenna
- 3 x USB, 1 x IEEE1329, PCMCIA Type II/III
- IR, SecureDigital media slot
- Over 2.5 hours battery life
- Weighs 3.4kg
- Windows XP Professional



$2695 NBTOS112

Tecra S1

The Toshiba Tecra S1 with Intel Centrino technology is the perfect notebook PC for organisations ready to implement wireless networking into the workplace.

- Intel Pentium M 1.4Ghz
- 1MB L2 Cache
- 256MB DDR RAM up to 1GB
- 40GB HDD
- 15" TFT Display @ 1024x768
- 32MB ATI Radeon 9000 Graphics
- 8X DVD/CDRW
- 56K Modem, 10/100 LAN, 802.11a/b Wi-Fi Antenna
- Integrated 802.11b Wi-Fi card
- 3 x USB 2.0, PCMCIA Type II/III
- IR, SecureDigital media slot
- Up to 3.4 hours battery life
- Weighs 2.6kg
- Windows XP Professional



$3695 NBTOS120

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Intel CPU

Pentium 4™ Socket 478

Pentium 4™ 1.8Ghz 400Mhz FSB	$275	CPINT092
Pentium 4™ 2.4Ghz 533Mhz FSB	$315	CPINT099
Pentium 4™ 2.67Ghz 533Mhz FSB	$375	CPINT101
Pentium 4™ 2.80Ghz 533Mhz FSB	$495	CPINT102
Pentium 4™ 3.0Ghz 533Mhz FSB	$745	CPINT103
Pentium 4™ 2.4Ghz 800Mhz FSB	$335	CPINT110
Pentium 4™ 2.6Ghz 800Mhz FSB	$425	CPINT111
Pentium 4™ 2.8Ghz 800Mhz FSB	$545	CPINT112
Pentium 4™ 3.0Ghz 800Mhz FSB	$799	CPINT113

Celeron™ Socket 478

Celeron™ 1.7Ghz	$119	CPINT096
Celeron™ 1.8Ghz	$129	CPINT098
Celeron™ 2.0Ghz	$139	CPINT104
Celeron™ 2.2Ghz	$149	CPINT105
Celeron™ 2.3Ghz	$179	CPINT106
Celeron™ 2.4Ghz	$195	CPINT107



AMD CPU

Opteron™

Opteron™ 240	$645	CPAMD083
Opteron™ 242	$1395	CPAMD084
Opteron™ 244	$CALL	CPAMD085

Athlon™ MP

AMD Athlon™ MP 2000+	$275	CPAMD071
AMD Athlon™ MP 2200+	$299	CPAMD077
AMD Athlon™ MP 2400+	$345	CPAMD078
AMD Athlon™ MP 2600+	$435	CPAMD081



Athlon™ XP

AMD Athlon™ XP 2000+	$139	CPAMD067
AMD Athlon™ XP 2100+	$169	CPAMD070
AMD Athlon™ XP 2200+	$175	CPAMD073
AMD Athlon™ XP 2400+	$195	CPAMD074
AMD Athlon™ XP 2500+ (Barton)	$205	CPAMD082
AMD Athlon™ XP 2600+	$229	CPAMD075
AMD Athlon™ XP 2700+	$299	CPAMD076
AMD Athlon™ XP 2800+ (Barton)	$375	CPAMD079
AMD Athlon™ XP 3000+ (Barton)	$499	CPU MD080
AMD Athlon™ XP 3200+ (Barton)	$875	PCAMD086

Duron™

1.3Ghz Duron™	$89	CPAMD069

Memory

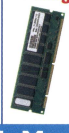
Generic RAM

128MB PC2100 DDR SDRAM	$45	RAGEN040
256MB PC2100 DDR SDRAM	$65	RAGEN041
512MB PC2100 DDR SDRAM	$125	RAGEN042
1GB PC2100 DDR SDRAM	$495	RAGEN079
256MB PC2700 DDR SDRAM	$69	RAGEN043
512MB PC2700 DDR SDRAM	$129	RAGEN062
1GB PC2700 DDR SDRAM	$999	RAGEN080
256MB PC3200 DDR SDRAM	$85	RAGEN067
512MB PC3200 DDR SDRAM	$175	RAGEN068
128MB PC133 SDRAM	$65	RAGEN030
256MB PC133 SDRAM	$95	RAGEN031
256MB PC133 SDRAM DOUBLE SIDED	$135	RAGEN078
512MB PC133 SDRAM	$155	RAGEN047



Kingston Memory

256MB PC133 SDRAM	$75	RAKIN000
512MB PC133 SDRAM	$165	RAKIN001
256MB PC2700 DDR SDRAM	$75	RAKIN002
512MB PC2700 DDR SDRAM	$145	RAKIN003
256MB PC3200 DDR SDRAM	$85	RAKIN004
512MB PC3200 DDR SDRAM	$195	RAKIN005



Notebook SODIMM

128MB PC-133 SODIMM	$79	RAGEN054
256MB PC-133 SODIMM	$99	RAGEN053
128MB DDR SODIMM	$79	RAGEN065
256MB DDR SODIMM	$89	RAGEN066



Flash Memory

SmartMedia (SM)

32MB	$35	RAAPA001
64MB	$55	RAAPA002
128MB	$95	RAAPA003



MultiMedia (MMC)

32MB	$45	RAAPA004
64MB	$89	RAAPA005
128MB	$125	RAAPA006



SecureDigital (SD)

32MB	$55	RAAPA014
64MB	$89	RAAPA015
128MB	$125	RAAPA016



Memory Stick (Sony Compatible)

32MB	$65	RAAPA011
64MB	$89	RAAPA012
128MB	$145	RAAPA013



Compact Flash (CF)

64MB	$69	RAAPA007
128MB	$99	RAAPA008
256MB	$199	RAAPA009
512MB	$325	RAAPA010



Pro Compact Flash (PRO CF)

High speed write at 4Mb/sec

64MB	$89	RAAPA029
128MB	$139	RAAPA030
256MB	$235	RAAPA031
512MB	$495	RAAPA032



PCMCIA Card Reader

PCMCIA adapters to quickly read Card Memory straight from your notebook.

Memory Stick Adapter	$55	RAAPA033
Compact Flash Adapter	$25	RAAPA021
SmartMedia Adapter	$35	RAAPA022
SecureDigital & MultiMedia Adapter	$55	RAAPA035
4 in 1 SM/MMC/MS/SD Adapter	$75	RAAPA036



USB Flash Disk

32MB	$45	RAAPA017
64MB	$65	RAAPA018
128MB	$89	RAAPA019
256MB	$145	RAAPA020
512MB	$295	RAAPA027
1GB	$695	RAAPA028



Palm Handhelds

Zire

Replace bulky paper planners, to-do lists and sticky notes with a convenient Palm Zire handheld.

- Motorola Dragonball EZ 16Mhz Processor
- Palm OS 4.1
- 160x160 Monochrome Display
- 2MB Memory
- Included HotSync cable via mini USB cable or Infrared.
- 112 x 74 x 16mm
- Weighs 109g



$235 NBPAL000

Zire 71

View your appointments and addresses, capture pictures, listen to MP3s, and watch video clips with the Palm Zire 71.

- Texas Instruments ARM 144Mhz Processor
- Palm OS 5.2.1
- 320x320 Transflective Dispay with 65K Colours
- 16MB SDRAM Memory
- Integrated Camera up to 640x480
- MP3/Video playback software
- Supports MMC & SD expansion cards
- HotSync Cradle for USB or Infrared.
- 114 x 74 x 17mm
- Weighs 150g



$575 NBPAL004

Tungsten T

The performance you need to organise your work and your life. Stay productive when you're on the go.

- Texas Instruments ARM Processor
- Palm OS 5.0
- 320x320 Dispay with 65K Colours
- 16MB SDRAM Memory
- Bluetooth compatible
- MP3/Video playback software
- Supports MMC & SD expansion cards
- HotSync Cradle for USB or Infrared.
- 102 x 77 x 15mm
- Weighs 159g



$745 NBPAL001

Tungsten C with 64MB memory & 802.11b Wi-Fi capability

$945 NBPAL003

Tungsten W with built-in Keyboard & GSM/GPRS phone capability

$1125 NBPAL002

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Gigabyte Motherboards

GA-8SIMLH

- For Intel P4 with HT Technology
- 533/400 FSB Support
- SiS 651 Chipset
- 2 x DDR333/266 up to 2GB
- Onboard Graphics
- Onboard 2-Channel Audio
- Onboard 10/100 LAN
- 1 x AGP(4X), 3 x PCI, 2 x USB2.0, 4 x front/rear USB option
- Micro ATX Form



$145 MBGIG073

GA-8S648FX

- For Intel P4 with HT Technology
- 800/533/400 FSB Support
- SiS 648FX Chipset
- 3 x DDR266 to 3GB, DDR400/333 to 2GB
- 6-Channel Audio with SP/DIF
- Optional 3 Port IEEE1394 Daughter card
- 1 x AGP(8X), 5 x PCI, 2 x USB2.0
- ATX Form

NEW



$175 MBGIG108

GA-8IG1000

Intel Extreme Graphic

- For Intel P4 with HT Technology
- 800/533/400 FSB Support
- Intel 865G Chipset
- Intel Extreme Graphics Engine 2
- Dual Channel 4 x DDR400/333/266 up to 4GB
- 6-Channel Audio with SP/DIF
- 1 x AGP(8X), 5 x PCI, 4 x USB2.0
- ATX Form



$215 MBGIG101

GA-8IG1000 PRO **$275** MBGIG035

GA-8IPE1000

- For Intel P4 with HT Technology
- 800/533/400 FSB Support
- Intel 865PE Chipset
- Dual Channel 4 x DDR400/333/266 up to 4GB
- 6-Channel Audio with SP/DIF
- 1 x AGP(8X), 5 x PCI, 2 x USB2.0, 4 x front/rear USB option
- ATX Form

NEW



GA-8IPE1000 Pro

- Intel 10/100 LAN
- 2 x 1394 Firewire

$255 MBGIG103 **$295** MBGIG104

GA-7VAC

- For AMD Socket A
- 333/266/200 FSB Support
- VIA KT333 Chipset
- 3 x DDR333/266 up to 3GB
- Onboard 6-Channel Audio with SPDIF function
- 1 x AGP(4X), 5 x PCI, 2 x USB2.0, 4 x front/rear USB option
- ATX Form



$125 MBGIG078

GA-7VAXI394A

- For AMD Socket A
- 333/266/200 FSB Support
- VIA KT400 Chipset
- 3 x DDR400/333/266 up to 3GB
- Onboard 6-Channel Audio
- 1 x AGP(8X), 5 x PCI, 2 x USB2.0, 4 x front/rear USB option
- Integrated 10/100 LAN, 3 x FireWire IEEE1394
- ATX Form

NEW



$185 MBGIG109

GA-7VAXP-A **$199** MBGIG110

MSI Motherboards

MS-6533XG-L

- For Intel P4 with HT Technology
- 533/400 FSB Support
- SiS 651 Chipset
- 2 x DDR333/266/200 up to 2GB
- Onboard Graphics
- Onboard 6-Channel Audio
- Onboard 10/100 LAN
- 1 x AGP(4X), 3 x PCI, 1 x CNR, 2 x USB2.0, 4 x front/rear USB option
- Micro ATX form



$135 MBMSI033

865GM2-LS

- For Intel P4 with HT Technology
- 800/533/400 FSB Support
- Intel 865G Chipset
- Intel Extreme Graphics Engine 2
- 2 x DDR400/333/266 up to 2GB
- Onboard 6-Channel Audio; optional SP/DIF bracket
- Serial ATA /150 for up to 150Mb/s speed
- 1 x AGP(8X), 3 x PCI, 8 x USB2.0 (front/rear), Intel 10/100 Network
- ATX Form

NEW



$199 MBMSI044

865PE Neo2-LS

- For Intel P4 with HT Technology
- 800/533/400 FSB Support
- Intel 865PE Chipset
- 4 x DDR400/333/266 up to 4GB
- Onboard 6-Channel Audio; optional SP/DIF bracket
- Serial ATA /150 for up to 150Mb/s speed
- 1 x AGP(8X), 5 x PCI, 8 x USB2.0 (front/rear)
- Intel 10/100 Network
- ATX Form

AWARD WINNER



$275 MBMSI045

KM2M Combo

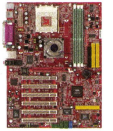
- For AMD Socket A
- 266/200 FSB Support
- VIA KM266 Chipset
- 2 x DDR266/200 up to 2GB
- Onboard Graphics
- Onboard 6-Channel Audio
- Onboard 10/100 LAN
- 1 x AGP(4X), 3 x PCI, 2 x USB2.0, 4 x front/rear USB option
- Micro ATX form



$139 MBMSI037

KT4A Ultra-SR

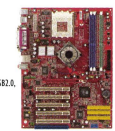
- For AMD Socket A
- 333/266/200 FSB Support
- VIA KT400A Chipset
- 3 x DDR400/333/266 up to 3GB
- Onboard 6-Channel Audio with optional SPDIF
- 2 x Serial ATA(100, 1 x ATA133, Supports RAID 0 or 1
- 1 x AGP(8X), 6 x PCI, 2 x USB2.0, 6 x front/rear USB option
- ATX Form



$255 MBMSI043

K7N2G-L

- For AMD Socket A
- 333/266/200 FSB Support
- nVIDIA nforce2 IGP Chipset
- 3 x DDR400/333/266 up to 3GB
- Onboard GeForce4 MX Graphics
- Onboard 6-Channel Audio
- Onboard 10/100 LAN
- Onboard TV-Out Encoder
- 1 x AGP(8X), 5 x PCI, 1 x ACR, 2 x USB2.0, 4 x front/rear USB option
- ATX Form



$255 MBMSI038

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Graphics / TV

GeForce4 MX440SE

nVIDIA GeForce4 MX440SE
64MB RAM
Supports AGP 4X/2X
Memory bandwidth up to 8.8GB/sec
Up to 2048 x 1536 @75Hz



DRAM **$89** DCGEM029
DDR w TV-Out **$99** DCGEM033

LeadTek WinFast TV2000 XP Deluxe

WinFast TV2000 XP is the smartest and most effective way of turning your PC into a high definition TV entertainment center.

- TV/Video/FM PCI Capture Card
- Watch high-quality TV with dbx-stereo in full screen or a scalable window
- NTSC, PAL or SECAM
- S-Video & 1 x RCA Input
- 3.5mm Stereo Jack for Audio In/Out
- Remote Included



$125 MMLEA001

LifeView FlyTV Box

The FlyTV Box is a true standalone TV box with no software and driver required. You can watch TV, video, or play TV-games on any LCD or CRT monitor up to 1024x768 resolution. Comes with Remote.

- Auto scan TV frequency up to 125 channels
- Composite Video & S-Video input
- 3.5mm Stereo Jack for Audio Input/Output



$255 MMGEN035

Gigabyte Graphics

MAYA II Radeon 9200

128-bit ATI Radeon 9200
64MB DDR RAM
Supports AGP 8X/4X
Four parallel rendering pipelines process up to 1.2 billion pixels per second
DVI/TV-OUT
Alternative Vivo model supports Video-in

NEW



128MB **$199** DCGIG011
128MB VIVO **$249** DCGIG012

$165 DCGIG010

MAYA II Radeon 9500

- 128-bit ATI Radeon 9500
- 64MB DDR RAM
- Supports AGP 8X/4X
- Pixel shaders used to accelerate video
- Gigabyte V-Tuner allows overclocking of your VPU and Memory
- DVI/TV-Out



$299 DCGIG006

MAYA II Radeon 9800 PRO

- 256-bit ATI Radeon 9800 PRO
- 128MB DDR RAM
- Supports AGP 8X
- 8-pixel pipeline architecture
- Gigabyte V-Tuner allows overclocking of your VPU and Memory
- DVI/TV-Out

NEW



$899 DCGIG013

LeadTek Graphics

A310 TD MyVIVO

- nVIDIA GeForce FX 5600
- 128MB DDR RAM
- Supports AGP 8X
- 8.8 GB/sec memory bandwidth
- 1.3 Billion AA samples/sec fill rate
- 81 Million vertices/sec
- Video capture from VCR, camcorder, LD/VCD/DVD player
- DVI up to 1600x1200
- TV-Out up to 1024x768



A280 TD Ti 4200 MyVIVO
$325 DCLEA010

$375 DCLEA037

A340 Ultra TD MyVIVO

- nVIDIA GeForce FX 5200 Ultra GPU
- 128MB DDR RAM
- Supports AGP 8X
- 350MHz RAMDACs
- 10.4 GB/sec memory bandwidth
- 1.3 Billion AA samples/sec fill rate
- 81 Million vertices/sec
- DVI up to 1600x1200
- TV-Out up to 1024x768



A180 DDR TDH MX440 MyVIVO
$175 DCLEA029

$199 DCLEA035

WinFast A350 Ultra TDH MyVIVO

- nVIDIA GeForce FX 5900 Ultra GPU
- 256MB DDR RAM
- Supports AGP 8X
- 400MHz RAMDACs
- 27.2 GB/sec memory bandwidth
- 3.6 Billion AA samples/sec fill rate
- 338 Million vertices/sec
- DVI up to 1600x1200
- TV-Out up to 1024x768



$949 DCLEA038

Asus Graphics

V9180

- NVIDIA® GeForce 4 MX440-8X
- 64MB DDR RAM 512Mhz
- 350Mhz RAMDAC
- Supports AGP 8X/4X/2X
- AGP 8X bandwidth of 2.1 GB/s
- TV-Out & VGA
- Includes S-Video to Composite Cable



$125 DCASU015

V9560TD

- NVIDIA® GeForce FX 5600
- 128MB DDR
- Supports AGP 8X/4X/2X
- CineFX™ delivers unprecedented effects
- Digital Vibrance Control 3.0
- TV-Out, VGA & DVI Support
- Bundled cable supports 2nd VGA Output



$375 DCASU016

V9900

NEW

- NVIDIA® GeForce FX 5800
- 128MB DDR 800MHz
- Supports AGP 8X/4X/2X
- CineFX™ delivers unprecedented effects
- 3rd-generation Lightspeed Memory Architecture
- TV-Out, VGA & DVI Support
- Bundled cable supports 2nd VGA Output



$899 DCASU017

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Lite-On Optical Drives

52x CD-ROM

- Transfer rate of up to 7,800Kb/s
- E-IDE Interface
- Easy-Tray® design for both horizontally & vertically use

$45 MMLIT000

16x DVD-ROM

- 16x DVD-Rom/48x CD-Rom Drive
- E-IDE Interface
- Easy-Tray® design for both horizontally & vertically use

$79 MMLIT003

52x24x52 CD-RW

- Writes CD-R at 52x/CD-RW at 24x
- Reads at up to 52x
- E-IDE Interface
- Easy-Tray® design for both horizontally & vertically use



$89 MMLIT009

40x24x40 Ext CD-RW

- Writes CD-R at 40x/CD-RW at 24x
- Reads at up to 40x
- Top loading disc and stylish design
- USB 2.0 connection to ensure 40x performance
- USB 1.1 connection reads/writes at 6x/4x
- Weighs 1Kg
- 152 x 44.3 x 198mm



$239 MMLIT007

Portable CD-RW/DVD

- Writes CD-R at 24x/CD-RW at 12x
- Reads CD at 24x/DVD at 8x
- Top loading disc and stylish design
- USB 2.0 connection to ensure 24x performance
- USB 1.1 connection reads/writes at 6x/4x
- Weighs 0.42Kg
- 138 x 24.7 x 177mm



$355 MMLIT010

LG Optical Drives

52x CD-ROM

- Transfer rate up to 7,800KB/sec
- E-IDE Interface
- Mounts Vertically & Horizontally



$49 MMLGS002

16x DVD-ROM

- 16x DVD-Rom/48x CD-Rom Drive
- E-IDE Interface
- Mounts Vertically & Horizontally



$79 MMLGS004

Portable CD-RW/DVD Combo

Slim, Compact, Portable Design for Easy Mobility

- Writes CD-R at 24x/CD-RW at 10x
- Reads CD at 24x/DVD at 8x
- USB 2.0 connection to ensure 24x performance
- Weighs 0.35Kg
- Includes Playback & Recording Software



$445 MMLGS020

52x24x52 CD-RW

- Writes CD-R at 52x/CD-RW at 24x
- Reads at up to 52x
- E-IDE Interface
- Mounts Vertically & Horizontally



$95 MMLGS011

48x24x48 CD-RW+16x DVD Combo

- Writes CD-R at 48x/CD-RW at 24x
- Reads CD at 48x/DVD at 16x
- E-IDE Interface
- Mounts Vertically & Horizontally



$159 MMLGS013

DVD-RW

- Record data up to 4.7GB per side on DVD media
- Writes DVD-R at 2x/DVD-RW at 1x
- Writes CD-R at 12x/CD-RW at 8x
- Reads DVD at 10x/ CD at 32x
- E-IDE Interface
- Mounts Vertically & Horizontally



$475 MMLGE502

DVD & DVD-R MULTIDRIVES

Sony MPDAP20U

The Sony MPDAP20U combines the functions of an advanced Portable Audio Player with a PC Combo Drive and FlashMemory Reader. Stand-Alone it plays Audio CD's, MP3 & WAV files. When connected to a computer it burns CD's, reads & writes to a MemoryStick, plays CD and DVD disks.

- Reads: 24X CD/8X DVD
- Writes: 24X CD-R/8X CD-RW
- Earphones with remote
- Memory Stick Slot
- Built-in Battery
- Plug-n-Play USB2.0 Interface
- Desktop Cradle & Battery Extender
- Software Included: B's Recorder Gold, B's clip, MusicMatch, Photostudio, PhotoBase, Videolmpression, Retrospect, CyberLink PowerDVD



$655 MMSON031

Sony DRU 510A

Enhanced performance and compatability. It records and plays both CDs and DVDs, the latter in both +R/RW and -R/RW format. Shipping as a kit, it comes with an extensive suite of Windows software for video, audio and data recording.

- Sony DRU 510A IDE Drive
- 8MB Cache Buffer
- Reads: 12X DVD/32X CDROM
- Writes: 4x DVD-R, 2x DVD-RW, 4x DVD+R, 4x DVD+RW
- Writes: 24x CD-R, 16x CD-RW
- Software Included: HERITAS Record Now DLA & SimpleBackup, SONIC MyDVD, ARCSOFT ShowBiz, CYBERLINK PowerDVD and MUSICMATCH Jukebox
- Interface cable and screws



$645 MMSON030

Pioneer DVR-A05

Pioneer has achieved 4x write speed to DVD-R and 2x to DVD-RW ahead of competing brands, improving the recording speed provides an easy to use and fast writing environment.

- Pioneer DVR-A05 IDE Drive
- 2MB Writer Buffer/512Kb Read Buffer
- Reads: 12X DVD/32X CDROM
- Writes: 4x/2x/1x DVD-R, 2x/1x DVD-RW/16x CD-R/8x CD-RW
- Software Included: BLEAD Workshop SE, Video Studio 6 SE DVD, PictureShow SE, RecordNow DVD/VCD, DLA Storage Guard, Cyberlink PowerDVD XP
- Includes 1 x DVD-RW & 1 x DVD-R Media



$499 MMPIO006

CD/DVD Media



10 Pack 80Min CD-R	**$12**	MMVEB029
50 Pack 80Min CD-R	**$35**	MMVEB040
5 Pack 700Mb CD-RW	**$9**	MMVEB030



DVD-R	**$9**	MMVEB036
DVD-RW	**$12**	MMVEB037
DVD+R	**$10**	MMVEB038
DVD+RW	**$12**	MMVEB039

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Hard Drives

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Caviar



- Ultra ATA/100
- 9ms Avg. Seek time
- 5400RPM
- 2MB Cache Buffer

GB	$125 WDWES080
GB	$155 WDWES081
GB	$175 WDWES082
0GB	$199 WDWES021
0GB	$225 WDWES083

- Ultra ATA/100
- 8.9ms Avg. Seek time
- 7200RPM
- 2MB Cache Buffer

40GB	$139 WDWES015
60GB	$165 WDWES017
80GB	$185 WDWES019
120GB	$245 WDWES023
200GB	$475 WDWES027

Seagate

Barracuda



- Ultra ATA/100
- 8.5ms Seek time
- 7200 RPM
- 2MB Cache Buffer

- Serial-ATA (ATA 150)
- 8.5ms Seek time
- 7200 RPM
- 8MB Cache Buffer

40GB	$139 HDSGT057		
80GB	$185 HDSGT068	80GB	$275 HDSTG075
120GB	$235 HDSGT069	120GB	$299 HDSGT074
160GB	$325 HDSGT076	160GB	$345 HDSG7077

Notebook Hard Drive



- 9mm 2.5" Hard Drive
- ATA-100 IDE Interface
- 4200 RPM
- Compatible with most Notebooks

10GB	$155 HDHITT005
20GB	$175 HDHITT008
30GB	$225 HDHITT010
40GB	$275 HDHITT011

Maxtor

DiamondMax



- Ultra ATA/133
- 9ms Avg. Seek time
- 7200 RPM
- 8MB Cache Buffer

- Ultra320 SCSI
- 4.3ms Avg. Seek time
- 10000 RPM
- 8MB Cache Buffer

0GB	$185 MDMAX020		
0GB	$245 MDMAX032	36.7GB	$545 MDMAX040
0GB	$325 MDMAX033	73.4GB	$795 MDMAX041
0GB	$455 MDMAX034	147.1GB	$1395 MDMAX042

Atlas IV

Maxtor Personal Storage 5000DV

Backup your files with a simple push of a button.

- Ultra ATA/133
- 9.3ms Avg. Seek time
- 7200RPM
- 8MB Cache Buffer
- Hot Swappable
- USB2.0 & IEEE1394 FireWire Interface
- Interface cables included
- Includes power cable & vertical stand
- (W)152 x (L)229 x (H)41mm
- Weights 1.2kg



120GB	$545 MDMAX045
160GB	$675 MDMAX046
200GB	$795 MDMAX047

PC & Mac Compatible

*USB 2 Hard Drives are backwards compatible with USB 1.1 ports, however, transfer rates will be limited to USB 1.1 specifications.

Cases

Adelong M7I ATX



- 4 x External 5.25" Bays
- 1 x External 3.5" Bays
- Front USB
- W: 200mm
- D: 491mm
- H: 422mm
- Power Supply: 300W ATX

$79 CAADE092

Adelong Midi ATX



- 4 x External 5.25" Bays
- 2 x External 3.5" Bays
- Front USB & Audio In/Out
- W: 200mm
- D: 491mm
- H: 422mm
- Power Supply: 300W ATX

$79 CAADE094

Adelong Mini Server Case



- W: 224mm
- H: 436mm
- D: 500mm
- Drive Bays:
- 8 x 5.25" (1 Internal)
- 5 x 3.5" (4 Internal)
- Power Supply: 400 Watt ATX
- 2 Additional cooling fans

$149 CAADE025

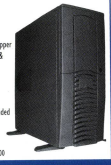
Lian Li PC-60



- 4 x External 5.25" Bays
- 3 x External 3.5" Bays
- 5 x Internal 3.5" Bays
- 2 x Front USB 2.0
- 4 x Ball Bearing Fans
- Tool-less detachable front panel
- W: 210mm
- D: 440mm
- H: 485mm
- Power Supply not included

$299 CALIA002

Chieftec DX-01



- 3 x External 5.25" Bays
- 2 x External 3.5" Bays
- 2 x Internal 3.5" Bays
- Front USB & IEEE1394 FireWire
- Screw-less PCI Card Clipper
- Thumbscrews for FDD & HDD installation
- W: 180mm
- D: 440mm
- H: 460mm
- Power Supply not included

$155 CACHD000

CoolerMaster ATC 710



- 4 x External 5.25" Bays
- 2 x External 3.5" Bays
- 4 x Internal 3.5" Bays
- Front USB & IEEE1394 FireWire
- Tool-less assembly
- Lockable front bezel and side panel
- Zinc-coated steel
- W: 205mm
- D: 455mm
- H: 522mm
- Power Supply not included

$275 CACOL000

Power Supplies

250W P4 ATX POWER SUPPLY	$35 PSGEN002
300W P4 ATX POWER SUPPLY	$49 PSGEN003
350W P4 ATX POWER SUPPLY	$55 PSGEN011
400W P4 ATX POWER SUPPLY	$65 PSGEN015



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Acer Monitors

3 YEAR WARRANTY

15" LCD AL512

The AL512 combines in one compact space-saving design the benefits of the latest 15" LCD technologies alongside an integrated audio system.

- 15" TFT-LCD
- 0.297mm Dot Pitch
- 16.7M Colours
- Contrast Ratio 350:1
- Up to 1024 x 768 @ 75Hz
- 351(H) x 356(W) x 182(D)mm
- Weighs 4.1kg
- Built-in Speakers



$525 MOACE014

15" LCD AL532

Professional 15" LCD with a stylish design, super fast response times and one of the widest viewing angles.

- 15" TFT-LCD
- 0.297mm Dot Pitch
- 16.7M Colours
- Contrast Ratio 500:1 & 25ms response time
- 140 Horizontal Viewing Angle
- Up to 1024 x 768 @ 75Hz
- 341(H) x 348(W) x 131(D)mm
- Weighs 3.3kg
- Built-in Speakers



$595 MOACE025

17" LCD AL707

The AL707 is the ideal solution for the home or office PC users requiring a smar interface with a broader view.

- 17" TFT-LCD
- 0.264mm Dot Pitch
- 16.7M Colours
- Contrast Ratio: 500:1
- Up to 1280 x 1024
- 449(H) x 422(W) x 215(D)mm
- Weighs 5kg



$749 MOACE016

19" LCD AL922

AL922 the ultimate display, featuring excellent brightness combined with high resolution and built in speakers. For those that demand the best in their displays.

- 19" TFT-LCD
- 0.294mm Dot Pitch
- 16.7M Colours
- Contrast Ratio 500:1
- Up to 1280 x 1024 @ 75Hz
- 447(H) x 433(W) x 235(D)mm
- Weighs 6.5kg
- Built-in speakers



$1450 MOACE018

17" CRT AC711

The AC711 offers the perfect solution to work effectively with no compromise to personal comfort.

- 16.1" Viewable
- 0.27mm Dot Pitch
- Up to 1280 x 1024 @ 60Hz
- 427(H) x 405(W) x 419(D)mm
- Weighs 14.9kg



$225 MOACE017

19" CRT AC901

Highly recommended for business applications with OSD and high technology fla tube.

- 18" Viewable
- 0.26mm Dot Pitch
- Up to 1600 x 1200 @ 85Hz
- On screen display for easy adjustments
- 476(H) x 455(W) x 416(D)mm



$349 MOACE022

NEC LCD Monitors

3 YEAR WARRANTY

15" LCD1560V

A space-saving thin-frame LCD monitor, offers you unrivaled value and performance. Also featuring automatic adjustment of your monitor to optimal settings.

- 15" TFT LCD
- 0.297mm dot pitch
- 16M colors
- 1024 x 768 @ 75Hz
- 344.8 mm (W) x 344.2 mm (H) x 166 mm (D)
- D-Sub and DVI -Digital Input
- Weighs 3.7kg
- Black or silver colour option



$545 MONEC016

17" LCD1760V

Take your visual experience to the next level of performance and enjoyment with the 17" NEC MultiSync LCD1760NX, a digital flat-panel monitor featuring a thin-frame design.

- 17" TFT-LCD
- 0.264mm dot pitch
- 16M colours
- Up to 1280 x 1024 @ 75Hz
- 374 mm (W) x 383.6 mm (H) x 196 mm (D)
- D-Sub and DVI -Digital Input
- Weighs 5.8kg
- Black or silver colour option



$949 MONEC017

18.1" LCD1860NX

A flat-panel monitor featuring a thin-frame design, enhances your visual experie with superior screen performance offering wide angle views of up to 160°.

- 18" TFT-LCD
- 0.281mm dot pitch
- 16.7M colours
- Up to 1280 x 1024 @ 75Hz
- 398 mm (W) x 402.8 mm (H) x 200 mm (D)
- D-Sub and DVI-Digital Input
- Weighs 8.3kg
- Black colour option



$1495 MONEC018

Mitsubishi LCD Monitors

3 YEAR WARRANTY

15" DV159 Slim

New Slim line design provides one of the brightest and sharpest images available from any 15" LCD.

- 15" Viewable LCD
- 0.3mm Dot Pitch
- 16.7M Colours
- Contrast Ratio: 400:1
- Up to 1024 x 768
- Built in Speakers 1Watt/Channel
- Weighs 3.5kg



$599 MOMIT060

17" DV172B

High contrast active matrix LCD brings a superior display to your desktop today!

- 17" Viewable LCD
- 0.264mm Dot Pitch
- 16.7M Colours
- Contrast Ratio: 500:1
- Up to 1280 x 1024
- Built in Speakers 1Watt/Channel
- Weighs 4.4kg



$899 MOMIT061

17" Diamond View 1770H

Diamond View range of monitors deliver excellent quality and reliability at an affordable price.

- 15.9" Viewable
- 0.23mm Dot Pitch
- Up to 1280 x 1024 @ 65Hz
- On screen controls for easy adjustments
- 371(H) x 406(W) x 413(D)mm



$235 MOMIT026

19" 1998E **$395** MOMIT029

21" 2115E **$1045** MOMIT045

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ADELONG australia

Linksys Wireless Networking Solutions

Wireless-G (802.11g)

The 54Mbps wireless networking standard that is almost five times faster than the widely deployed Wireless-B (802.11b) products found in homes, businesses, and public wireless hotspots around the country - but since they share the same 2.4Ghz radio band, Wireless-G can also work with existing 11Mbps Wireless-B equipment.

letwork Access Point

Linksys Wireless-G Access Point you connect Wireless-G or less-B devices to the network porting Wireless Bridging, Address filtering, Event Logging.



$299 WWLIN043

Broadband Router

The Linksys Wireless-G Broadband Router is really three devices in one box. First, there's the Wireless Access Point, then there's a built-in 4-port full-duplex 10/100 Switch, and finally the Router function lets your whole network share a high-speed cable or DSL Internet connection.



$325 WWLIN042

PCI Adapter

The Linksys Wireless-G PCI Card installs in most desktops and lets you put your computer almost anywhere in the building, without the cost and hassle of running network cables.



$175 WWLIN041

Notebook Adapter

The Linksys Wireless-G Notebook Adapter slides into your notebook's 32-bit CardBus slot for you to enjoy network access with your computer notebook while retaining true mobility.



$179 WWLIN040

Wireless-B (802.11b)

The widely adopted Wireless-B networking from Linksys delivers the freedom to configure your network your way. With data transfer rates at up to 11Mbps and the number of public wireless hotspots growing rapidly, don't be bound by cabling restrictions any longer!

letwork Access Point

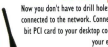
dvanced user authentication feature ensures a high level etwork security. Windows d diagnostics and statistic ensure that you'll always n control.



$245 WWLIN013

PCI Adapter

Now you don't have to drill holes in your walls to get connected to the network. Connect your Linksys Wireless 32-bit PCI card to your desktop computer to keep in touch with your e-mail, access the Internet, use instant messaging, and share files.



$199 WWLIN008

Compact USB Adapter

Just plug the Linksys Wireless Compact USB Adapter into an available USB port on your notebook or desktop computer, and you're ready to communicate.



$189 WWLIN009

Notebook Adapter

The Linksys Wireless Network PC Card allows you to share printers, files, and other resources anywhere within your LAN infrastructure through one Type II or III PCMCIA slot.



$145 WWLIN004

Networking Solutions

4-Port Cable/DSL Router

4-Port Cable/DSL Broadband Router is the ideal networking solution for home business users connecting up to 253 users to a high speed Internet connection. platform independent multi-function router combines a 4-port 10/100 Mbps l speed switch, full-ured SPI firewall, and work management system in one convenient device.



$175 WWSMC005 VPN Plus $215 WWSMC009

Wireless 4-Port Cable/DSL Router

The Wireless 4-Port Cable/DSL Broadband Router is the ideal networking solution for any home and business user, providing a 10/100 WAN port for high-speed integration into your network. Simultaneous Internet access for up to 253 PCs using a single purchased IP address.



$295 WWSMC015 VPN Plus $375 WWSMC016

Wireless Broadband Router/Print Server

The multifunction router is designed specifically for the SOHO user. Combining a 3-port 10/100 switch, with an 11Mbps wireless access point, firewall security, and a built-in print server.



$275 WWSMC017

Wireless PC Card

E 802.11b compliant 11 Mbps wireless PC card. It meets the needs of small siness and corporate users who require an 11 Mbps wireless connection to an sting LAN. The notebook adapter tures an operating range of up to 0m, and true plug-and-play tallation.



$145 WWSMC025

3 Port Print Server

A Print Server with a multi-protocol 10/100 LAN and three parallel ports is designed to offer a simple and flexible solution for your entire network printing needs. You can now connect or support up to three printers, plotters or equality printers in the most convenient spots in your office environment.



$175 WWSMC012

Ethernet HUB

These 10/100 Ethernet Hubs are auto-sensing, dual-speed hubs that offer a simple, cost-effective strategy for integrating Fast Ethernet into your Ethernet network.

5-Port $59 WWSMC005
8-Port $79 WWSMC006
16-Port $175 WWSMC007



Netcomm Modems

ADSL USB Modem

ow you can enjoy the Internet, email and remote access at speeds up to 100 times ster than 56K modem. Designed with a Plug-&-Play bus-powered USB interface to se setup and use. A Microfilter is cluded to prevent interference with your lephone line.



$159 WWNET030

ADSL USB Modem/Router $179 WWNET031

Mega-i-Modem 56

A full duplex V.90 56k Data/Fax modem, Internet access at a low cost. Assembled with Caller Identification & Telephone Answering Maching capability.



$99 WWNET032

InModem 56 V.92

Delivers high-speed voice, data and fax transmission in an easy-to-install and trouble free PCI format. Internal modems are a simple to use, with nothing to connect except the RJ11 phone connection.



$35 WWNET033

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Skymaster

3.5" Crystal Hard Drive

- Integrated power supply
- 2.5cm cooling fan
- Includes power cable & foot stand
- PC & Mac compatible
- (W)162 x (L)208 x (H)36mm
- Weighs 1.5kg including cables



Case w/oHDD	USB 2*	FireWire
40GB	$255 HDADE006	$255 HDADE000
60GB	$275 HDADE007	$275 HDADE001
80GB	$295 HDADE008	$295 HDADE002
120GB	$345 HDADE011	$345 HDADE009
160GB	$425 HDADE012	$425 HDADE010

Case w/oHDD	USB 2*	FirewI
10GB	$235 HDADE013	$235 HDA
20GB	$255 HDADE014	$255 HDA
30GB	$295 HDADE015	$295 HDA
40GB	$345 HDADE016	$345 HDA

*USB 2 Hard Drives are backwards compatible with USB 1.1 ports, however, transfer rates will be limited to USB 1.1 specifications.

2.5" External Hard Drive

- Rotating Access LED
- Bus-powered, no power adapters required
- PC & Mac compatible
- (W)79 x (L)143 x (H)23mm



*USB 2 Hard Drives are backwards compatible with USB 1.1 ports, however, transfer rates will be limited to USB 1.1 specifications.

External 6 in 1 Reader

- USB 2.0 interface
- 4 sockets supports CF, MD, SM, MS, SD, MMC memory card
- USB bus-powered, no power adapters required
- All slots are active for copying across memory cards
- PC & Mac compatible



$55 MSGEN038

Internal 6 in 1 Reader

- 3.5" drive bay powered by internal USB
- 4 sockets supports CF, MD, SM, MS, SD, MMC memory card
- All slots are active for copying across memory cards
- Can also be used as an external reader
- PC & Mac compatible



USB 2.0 $55 MSSRY005
USB 1.1 $45 MSSRY006

5.25" Sky Case

- For standard 5.25" CD-ROM or CD-RW
- Ice white body & blue front bezel and foot pad
- 4cm cooling fan
- Includes power cable
- PC & Mac compatible



USB 2.0 $139 CAADE017
FireWire $145 CAADE074

PCI to USB 2.0

Connect your USB 2.0 devices to this easy to install PCI adapter. 100% backward compatible with all USB devices.



2-Port $35 CCGEN043
4-Port $49 MSSRY002

PCI to FireWire

Connect your IEEE 1394 FireWire devices to this easy to install PCI adapter.



2-Port $45 CCGEN039
2 x FireWire + 2 x USB2.0 Ports $95 CCGEN041

PCMCIA FireWire

Connect up to 63 FireWire devices through this 2-Port FireWire CardBus PCMCIA adapter.



3 Port USB 2.0 $75 CCGEN049
2 Port FireWire $85 CCGEN040
2 USB & 3 FireWire Combo $155 CCGEN050

I/O Expansion Card



CI Printer Card $39 CCGEN032
Dual PCI Printer Card $45 CCGEN037
PCI One High Speed Serial Port Card $49 CCGEN036
PCI Two High Speed Serial Port Card $55 CCGEN029

External 4-Port USB Hub

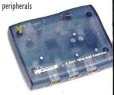
- Plug-n-Play capabilities for external peripherals
- Auto shut down when the PC is off
- Auto switch power source to bus power or self power



USB 2.0 $59 MSSRY001
USB 1.1 $45 DSADE063

External 3-Port FireWire Hu

- FireWire bus-powered, no power adapter required
- Plug-n-Play capabilities for external peripherals
- PC & Mac compatible



$55 DSADE080

IO/100 PCI Network Adapter

IO/100 PCI network adapter is an efficient, affordable, full-featured desktop resource. Auto-configurable upon power- up, it supports 32-bit data transfer mode. It features Wake-On LAN, enabling network management from remote locations.



$15 NWGEN021

IO/100 USB Network Adapter

IO/100 USB network adapter attaches to the desktop or mobile PC via the USB Port. No external power is needed and no further configuration is required once the USB adapter is automatically recognised.



$75 DSADE043

IO/100 PC Card

Connect your notebook computer to a 10BaseT or 100BaseTX network in just minutes. The IO/100 PC (PCMCIA) Card will allow you to share files, printers,Internet connections and more.



$75 NWGEN018

IO/100 Network Switch

- Auto-negotiation on all ports to match the speed of the attached devices
- NWay switch ports support full and half duplex, 10Mbps and 100Mbps connections
- Automatic polarity correction
- Small foot-print
- Non-blocking performance
- Plug-n-play installation



5-Port $59 NWGEN30
8-Port $79 NWGEN27
16-Port $199 NWGEN29

External USB Floppy

- USB 1.1 interface
- Compact & portable design
- Hot Plug-n-Play
- USB bus-powered, no power adapters required



$95 FDGEN000

5.25" Mobile Rack

- ATA-100 IDE Interface
- Compatible with ATA-100/66/33 Hard Drives
- Rear Mounted Cooling Fan



$25 MSADE000

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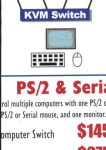
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KVM CPU Switch



Control multiple computers with a single monitor, keyboard & mouse!

Create more working space and cut down on cost. Switch between computers by pressing push buttons or entering hot-key commands.

Features:
- VGA resolution up to 1920 x 1440
- Auto-scan computers
- Hot plug KB and Mouse anytime
- Full LEDs to show status
- No software to install

Additional OSD Features:
- On-Screen-Display
- Password security locks
- Assign computers with unique names
- Optional 19" rack mount kits

Additional USB Features:
- Built-in USB 1.1 hub
- PC, iMAC, G3/G4 compatible
- Cables included



PS/2 & Serial

rol multiple computers with one PS/2 or AT keyboard, PS/2 or Serial mouse, and one monitor.

omputer Switch **$145** DSREK000

omputer Switch **$275** DSREK001

omputer Switch **$595** DSREK002

OSD PS/2 & Serial

4 Computer OSD Switch **$345** DSREK003

8 Computer OSD Switch **$645** DSREK004

16 Computer OSD Switch **$1295** DSREK005

19" Rack Mount Kit **$39** DSREK009

USB

Control multiple computers with one USB keyboard, one USB mouse, and one monitor.

2 Computer Switch with 3-Port USB Hub **$165** DSREK006

4 Computer Switch with 4-Port USB Hub **$275** DSREK007

4 Computer Hybrid USB & PS/2 Switch **$325** DSREK008

Accessories

1.8M PS/2 Cable Set **$29** CBGEN009

3.0M PS/2 Cable Set **$35** CBGEN164

5.0M PS/2 Cable Set **$45** CBGEN299

2.0M USB KVM Cable Set **$29** CBGEN300

Speakers

Creative Inspire 4.1 4400

incredibly powerful speaker system features four newly designed satellites with ue contours around the drivers for optimum sound dispersion

.1 Channel Audio
7W RMS Subwoofer/6W RMS Satellite (Total 41W)
40Hz - 20kHz Frequency Response
ncludes remote control
ombine with 4-channel
oundBlaster card to
xperience EAX sound

$135 MMCRE095



Creative Inspire 6.1 6600

With full 6.1 support from Audigy™ 2, Inspire 6.1 allows you to maximize your desktop entertainment with Dolby® Digital EX encoded movies, enhanced EAX® and MS DirectSound® 3D effects in games.

- 6.1 Channel Audio
- 22W RMS Subwoofer/8W RMS Satellite
- 20W Centre (Total 82W)
- 40Hz - 20kHz Frequency Response
- Includes desktop and center speaker stands

$275 MMCRE101



Inspire 5.1 5100 **$175** MMCRE083

Creative Inspire 5.1 Digital 5600

Complete and affordable Dolby Digital Home Theater System for your DVD player and Game Creative Inspire 5.1 Digital 5500 satisfies all your modern entertainment needs.

- 5.1 Channel Audio
- Dolby DTS decoder unit
- 24W RMS Subwoofer/6W RMS Satellite (Total 48W)
- 35Hz - 20kHz Frequency Response
- Desktop and center speaker stands, optical cable provided

$395 MMCRE102



Altec Lansing AVS500B

e compact AVS500B is a solid entry-level surround system that will instantly prove the way your PC sounds.

40Hz - 22kHz Frequency Response
6.1W RMS Subwoofer/2.2W RMS per Satelite
4.1 Channel Speakers
17W RMS Total Power Output
Built in controls

$139 MMALT013



ltec Lansing AVS 300 (2speaker + Sub) **$79** MMALT015

Altec Lansing 251

Large 3-inch drivers and a center channel deliver a full range of movement and sound while the ported subwoofer adds to the theatre-like atmosphere. Whether your into games, movies, the 251 is an excellent all-round system.

- 5.1 Channel Speakers
- 25W RMS Subwoofer/7.6W RMS Center
- 2x6.5W RMS front/2x7.2W RMS Rear
- 60W RMS Total Output Power
- 22Hz - 22kHz Frequency Response

$215 MMALT018



Altec Lansing 221 (2 Speaker + Sub) **$105** MMALT022

Altec Lansing XA3051

Top-of-the-line video gaming system features a center channel, a powerful subwoofer, and surround sound that put your TV's speakers to shame. Feel the bass. Unleash the power.

- 5.1 Channel Audio
- 18.25W RMS Subwoofer/17.5W RMS Center
- 5W RMS Satellite (Total 56W RMS)
- 6 Speaker Dolby Surround Pro Logic
- Dual headphone jack & Wall Brackets
- Auxillary Input (for DVDs, PS2, Xbox etc) & Color coded cables

$295 MMALT023



Altec Lansing XA3021 **$175** MMALT025

Creative Sound Cards

Sound Blaster Audigy 2 Platinum

und Blaster Audigy 2 delivers high-quality multi-channel recording and playback at up to -bit/96kHz and is the first PC product to offer playback of Advanced Resolution DVD-Audio at astonishing 24-bit/192kHz with a stunning Signal-to-Noise ratio of 106dB

Sound Blaster 24-bit audio
THX®-certified & Dolby digital EX
6.1 Surround Sound
24-BIT/ 96 kHz recording
EAX® advanced HD™ gaming
Audigy internal drive for firewire, analog digital ports

$475 MMCRE096

External **$545** MMCRE098





Creative Sound Blaster Vibra 128 **$39** MMCRE043

Creative Sound Blaster Live DE 5.1 **$79** MMCRE072

Creative Audigy 2 **$255** MMCRE097

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Color Printers

All printers are PC & Mac Compatible

PERSONAL Range - ideal for the casual user

hp deskjet 3325

- 1200 x 600 dpi Print Resolution
- Up to 8ppm Black & 6ppm Color
- 100 Sheet Paper Tray
- USB 2.0 Interface



$79 PRHPD175

Canon i320

- 2400 x 1200 dpi Print Resolution
- Up to 10ppm Black & 7ppm Color
- Thermal Bubble Jet Ink on demand
- Borderless 6" x 4" photo prints
- Supports Exif Print for better digital photo prints
- USB 2.0 Interface



$129 PRCANI05

hp deskjet 3820

- 4800 x 1200 dpi Print Resolution
- Up to 12ppm Black & 10ppm Color
- hp PhotoREt III
- Parallel & USB Interface



$145 PRHPD113

SOHO Range - ideal for the home office and small office

hp deskjet 5550

- 4800 x 1200 dpi Print Resolution
- Up to 17ppm Black & 12ppm Color
- Automatically detects paper type and adjust print settings
- Optional 6-color printing
- USB 2.0 and Parallel Interface



$185 PRHPD115

hp deskjet 6122

- 4800 x 1200 dpi Print Resolution
- Up to 20 Black & 13ppm Color
- PhotoREt 3 colour layering technology
- Double sided duplex printing
- USB 2.0 & Parallel Interface



$279 PRHPD166

Epson Stylus Photo 830U

- 5760 x 720 dpi Print Resolution
- Up to 14 Black & 13ppm Color
- PRINT Image Matching technology
- True BorderFree Printing
- USB Interface



$285 PREPS055

BUSINESS Range - ideal for high speed printing with flawless quality

Canon i550

- 4800 x 1200 dpi Print Resolution
- Up to 18ppm Black & 11ppm Color
- Advanced Microfine Droplet Technology
- Borderless A4 & 6" x 4" photo prints
- Supports Exif Print for better digital photo prints
- USB 2.0 & Parallel Interface



$289 PRCANI07

Canon i850

- 4800 x 1200 dpi Print Resolution
- Up to 22ppm Black & 14ppm Color
- Borderless A4 & 6" x 4" photo prints
- Print 6" x 4" photo in under a minute and a monochrome page in 3 seconds
- USB 2.0 & Parallel Interface

SPEED DEMON



$369 PRCANI06

hp business inkjet 2230

- 1200 x 600 dpi Print Resolution
- Up to 15 Black & 14ppm Color
- hp PhotoREt 3
- 16Mb Memory (Max 176Mb)
- 250 sheet bin
- 10,000 page per month duty cycle
- Parallel Interface



$455 PRHPD169

PHOTO Range - superb reproduction of photos & images

hp PhotoSmart 7150

- 8MB USB 2.0 Printer
- 4800 x 1200 dpi Print Resolution
- Up to 14 Black & 11ppm Color (with Optional black cartridge)
- Borderless 4" x 6" photo printing
- USB port for connection to PC/MAC
- 2nd USB port for direct printing from hp digital camera



$255 PRHPD178

Canon i470D

The i470D combines the convenience of digital camera and memory card direct printing, with impressive speeds and quality to deliver a versatile and cost-effective home photo printing solution.

- 4800 x 1200 dpi Print Resolution
- Up to 18ppm Black & 12ppm Color
- Borderless A4 & 6" x 4" photo prints
- 4-in-1 memory slot takes CF, SM, SD & Memory Stick - no adaptors required
- USB 2.0



$389 PRCANI90

Canon i950

- 4800 x 1200 dpi Print Resolution
- Up to 7ppm Black & 7ppm Color
- 6 individual ink tanks
- Borderless A4 & 6" x 4" photo prints
- Prints a glossy A4 photo in approx 1 minute
- Photo Management Software included
- USB 2.0 Interface



$629 PRCANI88

Laser Printers

Samsung ML 1510

- Up to 600 x 600 dpi Print Resolution
- Up to 14ppm Black
- 2Mb RAM
- 68Mhz Print Processor
- 250-Sheet Paper Tray
- USB Interface

BEST VALUE



$355 PRSAM020

hp LaserJet 1300

- 1200 x 1200 dpi Print Resolution
- Up to 20ppm Black
- 16Mb Ram (80Mb Max)
- 250 Sheet Tray
- USB 2.0 & Parallel Interface
- Postscript Level 2 Supported



$775 PRHPD145

Network ready with hp jetdirect 1300N **$1195** PRHPD156

hp LaserJet 1500L Color

- Up to 2400dpi with HP ImageRet
- 14ppm Black & 4ppm Color
- 16Mb RAM
- 150Mhz Print Processor
- 125 Sheet Tray
- 30,000 Pages per month duty
- USB Interface



$1495 PRHPD250

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Multi-Function

hp PSC 1210

Fast unit without compromise on functionality, this all-in-one is perfect for the home office.
- 1800 x 1200 dpi
- Printing and copying at 12ppm in black & White, 10ppm in color
- HP PhotoREt 3 colour technology
- Scan Color at 600 x 2400
- 30 sheet paper tray
- USB Interface



$265 PRHPD125

Canon imageCLASS MPC 190

Full function color photo printer with copier and scanning capabilities.
- 2400 x 1200 dpi Print Resolution
- Printing & Copying up to 14 Black & White/10 Colour ppm
- Borderless A4 and Photo 4" x 6" Printing
- Flatbed Color scanning at 9600dpi
- USB Interface



$275 PRCANI081

Epson Stylus CX3100

The Photo Quality Multi Functional Printer that delivers easy to use standalone colour copying and scanning.
- 5760 x 720 dpi Print Resolution
- Print up to 14 Black & 13 Color
- Copy up to 10 Black & 9 Color
- Flatbed 600 x 1200dpi Colour Scanning
- USB Interface



$345 PREPS056

Scanners

hp scanjet 2300c

Just for your creative projects -- easily scan photos, 3D objects, text and graphics with one touch of a button. Hp Memories disc-creator software for slide shows on a CD or TV via a DVD player
- 2400 x 1200 dpi Optical resolution
- 99,999 dpi enhanced resolution
- 48-bit color
- Hp Imaging, photo and OCR software
- USB 2.0 Interface



$149 ICHPD055

hp scanjet 3570c

For superb multimedia, documents or photo-quality scanning look no further then the 3570c. Get preview scans in as little as 10 seconds at a variety of resolutions and color depths.
- 1200 x 1200 dpi Optical resolution
- 99,999 dpi enhanced resolution
- HP Imaging, photo and OCR software
- 4 buttons : scan, copy, email & hp memories disc creator launch!
- Built in adaptor for 35mm slides & negatives
- USB 2.0 Interface



$275 ICHPD056

Canon 3000F

Equipped with three 'one-touch' scan buttons, the 3000F can even scan multiple page documents and save them directly as PDF files.
- 1200 x 2400 dpi Optical Resolution
- 48-bit colour
- One-touch Scan/Copy/E-mail buttons
- Integrated Transparency Unit for 35mm film negatives/slides
- USB 2.0 Interface



$275 ICCANO28

Digital Cameras

Canon PowerShot A300

The PowerShot A300 is the perfect entry level digital still camera for photographers looking ease of use without compromising on image quality.
- 3.2 MegaPixel CCD @ 2048 x 1536
- Video @ 640 x 480 pixels
- 3.3x digital zoom
- 16Mb Compact Flash Card
- 2 x AA NiMH Batteries
- USB Interface



$385 ICCANO60

Canon Digital IXUS 400

Offers high resolution shooting with the ability to also capture up to 3 minutes of continuous movie recording with audio.
- 4.0 MegaPixel CCD @ 2272 x 1704 pixels
- Video @ 320 x 240 pixels
- 3X optical zoom, 3.6X digital zoom
- 32Mb CF Memory supplied
- Li-ion battery and charger
- Only 185 grams



$979 ICCANO41

IXUS 3 with 3MegaPixel CCD
$795 ICCANO36

Kodak LS443

This feature-rich digital camera gives you everything you're looking for, in a stylish, user-friendly package.
- 4 MegaPixel for prints up to 20" x 30"
- 2530 x1659 pixels
- Professional-quality Schneider-Kreuznach Variogon lens
- 3X optical zoom, 3.3X digital zoom
- 1.8"" TFT Screen
- Auto picture rotation on camera, PC or TV
- 16Mb Internal Memory
- SD/MMC Memory Slot
- Special edition with LS443 camera dock and Li-Ion battery included



$999 IOKOD032

See page 5 for memory options and adaptors

Kodak USB easyshare dock

Kodak USB Easyshare dock
- Provides easy touch transfer of pictures from camera to PC.
- Recharges & flashes a rechargeable battery for Kodak DC & DX cameras.

$155 IOKOD033

Kodak CX 4200

Excellent choice for those wanting to experience quality digital shots at a great price.
- 2.0 MegaPixel for prints up to 8" x 10"
- 1632 x1232 pixels
- 2X digital zoom
- 1.6"" TFT Screen
- 16Mb Internal Memory
- SD/MMC Memory Slot
- 3 Volt Recharging Adaptor



$299 IOKOD029

CX4300 3 Megapixel Camera **$365** IOKOD033

Kodak CX4230

With outstanding color and exposure capabilities and a quality lens, you'll have crisp, sharp, colorful pictures.
- 2.0 MegaPixel for prints up to 8" x 10"
- 1632 x1232 pixels
- 3X optical zoom, 2X digital zoom
- 1.6"" TFT Screen
- 16Mb Internal Memory
- SD/MMC Memory Slot
- Uses 2xAA CRV3 Li Battery
- 3 Volt Adaptor



$379 IOKOD031

Kodak DX4330

Masterpieces are created with the DX4330, as you'll have all the features you'll need to do it all.
- 3.1 MegaPixel for prints up to 11" x 14"
- 2160 x1600 pixels
- 3X optical zoom, 3.3X digital zoom
- 1.8"" TFT Screen
- Continuous Video and Audio
- 16Mb Internal Memory
- SD/MMC Memory Slot
- Uses 2xAA CRV3 Li Battery
- 3 Volt Adaptor



$675 IOKOD010

Webcam / Digital Camera

QuickCam Express

Easy to use and economical. Great for video e-mails and face-to-face video calls.
- Still image capture up to 640 x 480 pixels
- Video capture up to 30 frames/sec @ 320 x 240
- USB Interface



$79 IOLOG022

QuickCam Messenger
Still image & video capture up to 640 x 480 pixels with built-in microphone.

$95 IOLOG045

ClickCam 310

2MB memory stores up to 160 photos and 15 seconds of video.
- Digital camera at up to 352 x 288 pixels
- Video capture at 15 frames/sec up to 176 x 144
- Webcam up to 640 x 480 pixels
- Video conferencing up to 30 frames/sec
- 10 second self timer
- 4 x AAA batteries included
- USB Interface



$115 IOLOG043

Pocket Digital

As small as a credit card, but it has all the features you want: high resolution, plenty of memory, and easy downloading.
- Simple point-and-shoot camera
- 16MB memory stores up to 52 high resolution images at 1.3 megapixels
- See both bright lights and dim details with Autobrite technology
- USB Interface, recharge via USB cable



$215 IOLOG047

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Software

Norton Personal Firewall 2003

Your maximum defense against hackers. It secures your PC, keeps your personal information private, and alerts you to attempted intrusions.



$89 SWSYM043

Norton AntiVirus 2003

The worlds most trusted antivirus solution. This easy-to-use program scans and cleans instant-message attachments as well as email messages. It removes viruses automatically, without interrupting your work.



$89 SWSYM025

Norton Internet Security

Provides essential protection from viruses, hackers, and privacy threats. Includes:

- Norton Antivirus
- Norton Personal Firewall
- Norton Privacy Control
- Norton Spam Alert
- Norton Parental Control



$135 SWSYM031

Norton SystemWorks 2003

Protects your PC from virus threats, optimises performance, fixes and prevents problems. Includes:

- Norton Antivirus
- Norton Utilities
- Norton CleanSweep
- GoBack Personal Edition

$135 SWSYM026

Norton SystemWorks 2003 Pro
Includes full version of Norton Ghost 2003

$175 SWSYM027



Input Devices

Microsoft Wireless Blue Optical Mouse

Turn any PS/2 or USB desktop into a bright, vibrant space with the 6-foot range Wireless Blue Optical Mouse. It offers a fun design with a wider, one-of-a-kind, clear scroll wheel and a signature red optical glow.



Wired Blue Optical

$89 IOMSTO56 **$55** IOMSTO55

Microsoft Multimedia Keyboard

Maximise your digital experience and have 1-button access to navigate music, the Internet, videos and programs you access frequently on any PS/2 desktop PC.



$69 IOMSTO57 **$45** IOMSTO115

MS Internet Keyboard

Logitech MX 300 Optical Mouse

- Most advanced optical system at 800dpi provides unparalled accuracy
- Quick Switch allows you to move between applications with 1-touch
- High resolution scroll wheel
- USB & PS/2 adapter



$59 IOLOGI49

Logitech Cordless Access Keyboard

- 2 metre range powered by 2xAA batteries (included)
- Comfortable zero-degree tilt design
- Access favorite websites & applications with 1-touch keys
- Control audio and video from keyboard
- PC & MAC Compatible
- USB & PS/2 adapter



$89 IOLOGI50

Corded Access Keyboa

$35 IOLOGI50

Miscellaneous

USB Laplink Data Cable

This USB Laplink cable allows you to transfer files between two computers equipped with USB ports without messy configurations.



$55 MSADE050

USB Wireless

These adaptors plug straight into your USB port to give you instant wireless access to PDAs, PCs and Mobiles phones.



USB Bluetooth Adaptor **$75** MSADE056

USB Infrared IrDA Adaptor **$79** MSADE057

Tekram DC-315U Ultra SCSI Card

- Transfer rate up to 20MB/s
- Support up to 7 devices
- SCSI Honda 50 Interface
- PCI Interface



$45 CCGEN019

3.5" Floppy Drive

- High reliability with aluminium diecast base
- Long life with direct spindle motor
- 1.44MB Storage Capacity



$20 FDPAN000

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Signature: Card No: Expiry: /

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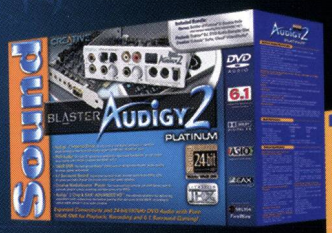
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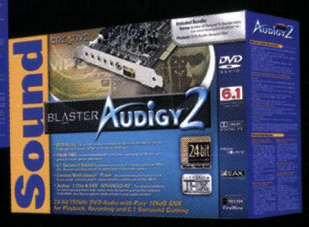
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